5-1993

A Replication and Validation Study of Methods for Calculating Self-Conception Disparity

George F. Loesch III

A REPLICATION AND VALIDATION STUDY OF METHODS

FOR CALCULATING SELF-CONCEPTION DISPARITY

by

George F. Loesch III

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Family and Human Development

Approved:

D. Kim Openshaw Ph.D Major Professor	Robert E. Sorenson Ph.D Committee Member
Thomas R. Lee Ph.D Committee Member	James P. Shaver Ed.D Dean of Graduate Studies

UTAH STATE UNIVERSITY
Logan, Utah

1993

ACKNOWLEDGMENTS

With deep affection and gratitude I wish to thank my major professor, Dr. D. Kim Openshaw, for his faith in me, his encouragement, patient guidance, and help to bring this project to completion. I am grateful to him, making time in his busy schedule and putting his personal projects on hold to give of his valuable time to assist me. I am also grateful to him for going the extra mile in taking care of administrative concerns with the University in my behalf, when I could not be on campus.

Appreciation is also expressed to Dr. Jay Schvaneveldt, head of the Department of Family and Human Development, for his kind letters of encouragement and concern, and granting me extra time to bring this project to completion.

Grateful acknowledgement is also given to the other members of my committee, Drs. Thomas R. Lee and Robert Sorenson, for their kind support, guidance, and encouragement.

I would also like to express love and gratitude for the help and support of my family, especially my mother who has provided emotional as well as financial support for this project. Her contributions are much

appreciated and will never be forgotten.

Finally, I would like to express gratitude and deep love and affection for my immediate family, my children, several who have been added to our family as I have been completing this project.

And last, but certainly not least, thanks to my wife and best friend, for her loving support and encouragement through this project.

George F. Loesch III

CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

A Replication and Validation Study of Methods
for Calcuating Self-conception Disparity

by

George F. Loesch III, Master of Science
Utah State University, 1993

Major Professor: Dr. D Kim Openshaw
Department: Family and Human Development

Self-esteem has been defined by James as a ratio of one's successes to one's pretensions. There are two formulas which have been utilized to calculate self-conception disparity. These formulas are the subtraction-absolute value formula and the ratio formula, which was derived from James. Stuart compared and contrasted these two formulas utilized to calcuate self-conception disparity. The purpose of this study was to replicate the work of Stuart, utilizing the same construct scales and statistical methodology, adding the Moos Family Environment Scale, and taking into account the age and gender of the respondent. The results of this study indicate, as the two formulas are compared, there is a difference in the amount of variance accounted for when the age and gender of the

subject are taken into consideration.

Two of the concerns that have been identified as a result of this study are 1) in relationship to the construct-related scales which were utilized in this study, are the two disparity formulas measuring the same parts of the construct scales for both males and females and in each age group?; and 2) why did age and gender have such an impact on the amount of variance accounted for between the two formulas for calculating self-conception disparity?

(136 pages)

INTRODUCTION

William James (1890) conceptualized the process by which self-esteem evolves, depicting his theoretical idea as a ratio of a person's successes to his or her pretensions (see Figure 1).

$$\frac{\text{Pretensions}}{\text{Successes}} = \text{Self-Esteem}$$

Figure 1. James' ratio formula of self-esteem.

Based on the formula, James postulated that an individual, introspectively, evaluates his or her real (successes) self-conception relative to his or her ideal (pretensions) self-conception on any of a number of personal attributes and/or social identity concepts relevant at that moment (Openshaw & Thomas, 1986; Stuart, 1990).

The real self-conception is the perception of who one "really" is at any moment in time. It is possible for the real self-concept to be positive (i.e., positive real self-conception, "I am an attractive person.") or negative (i.e., negative real self-conception," I am an unattractive person.") The ideal self-conception is best described as the perception the individual holds of himself or herself as they would ideally like to be at a given point in time and within

a given context (Turner, 1968).

The evaluative process suggested by James (1890) results in a discrepancy estimate commonly referred to as self-conception disparity (Wylie, 1974). It has been postulated that the amount of disparity is directly related to one's self-esteem. One theory, proposed by Rogers and Dymond (1954) suggests that the greater the disparity the more negative the self-esteem, whereas Achenbach and Zigler (1963) presented a diametrically opposing view, suggesting that the greater the disparity the more positive one's self-esteem. It is important to note that while obtaining different results, Achenbach and Zigler (1963) and Rogers and Dymond (1954) utilized the same procedure for calculating self-conception disparity, the subtraction-absolute value formula.

In an effort to better understand self-conception disparity and to attempt bringing conceptual clarity to the findings, Stuart (1990) empirically operationalized James' (1890) ratio formula and contrasted the findings using this formula with that of the subtraction-absolute value formula proposed by Rogers and Dymond and Achenbach and Zigler. Her findings suggested that when using the ratio formula a greater amount of variance was accounted for when examining construct-

variables than was acquired vis-a-vis the substraction-absolute value formula. In that Stuart analyzed group data, it is difficult to conclude with certainty that the ratio formula is superior to the subtraction-absolute value formula when partialing out gender and age.

Statement of the Problem

Stuart (1990) challenged the standard method of deriving a self-conception disparity score, the subtraction-absolute value formula, suggesting that a ratio formula derived from James' 1890 equation is preferred, because the ratio formula accounts for a greater proportion of the variance across identified extraneous construct-related self-esteem variables than does the substraction absolute formula. As noted above, however, Stuart does not take into consideration gender or age factors, which may influence the results of her study.

While the proposed research is an attempt to replicate Stuart's findings, it does so by addressing the major limitation of her work; namely taking into consideration the effect of age and gender on the amount of variance accounted for by the subtraction-absolute value formula in contrast to that accounted

for by the ratio formula. In addition to including those construct related variables used in Stuart's study in this research, six subscales of the Moos Family Environment Scale will be examined.

REVIEW OF THE LITERATURE

Among the many interpretations of self-conception disparity that have been advanced, three different interpretations were considered for this paper: those of Rogers and Dymond, 1945; Achenbach and Zigler, 1963; and Stuart, 1990. The most widely noted clinical interpretation of self-conception disparity has been proposed by Rogers and Dymond, in which they examined therapy outcome by quantifying the changes in self-conception disparity and relating it to the relative degree of psychological well-being or psychopathology (Kearny, 1988). In support of Rogers and Dymond several authors have identified as an index of psychological adjustment, the greater the disparity, the greater the psychopathology (Blatt, D'Afflitti, & Quinlan, 1976; Blatt, Wein, Chevron, & Quinlan, 1979; Blatt, Quinlan, Chevron, McDonald, & Zuroff, 1982; American Psychiatric Association, DSM III-R, 1987; Scott, 1958).

The second major interpretation was posited by Achenbach and Zigler (1963), who adopted a cognitive-developmental approach to conceptualizing the relationship between self-conception disparity and self-esteem. Their theory is that as an individual matures cognitively, this maturation permits the

individual to examine the relationship between the real self-conception and the ideal self-conception, thus enabling the individual to ferret out the differences between the two. That is, as an individual develops and integrates formal operational thought, he or she is more capable of clarifying the meaning of self-conception disparity in a positive direction, enhancing one's level of self-esteem (Phillips & Zigler, 1980). Thus, Achenbach and his associates postulated that as the individual cognitively matures (from concrete operations to formal operations), the greater the cognitive disparity, the more positive the self-esteem (Piaget, 1952, 1960; Werner, 1948).

More recently, Stuart (1990) used a developmental framework and empirically operationalized James' 1890 formula, hypothesizing that cognitive development and the skills associated therewith are an important factor in determining self-esteem. It was her position that the interpretation of self-conception disparity is a consequence of one's cognitive abilities and that this interpretation will affect self-esteem in either a positive or negative direction. In operationalizing James' ratio formula, it was her belief that such a formula would allow for scores that may be more reflective of not only the individual's stage of

cognitive development, but also would take into consideration factors that may influence cognitive processing of the interpretation of the self-conception disparity. Stuart's final conclusion was that the ratio formula would facilitate a more accurate understanding of the relationship between self-conception disparity and self-esteem.

While Stuart's conclusions are revealing and introduce a new methodological procedure for calculating and interpreting self-conception disparity, substantial limitations make it difficult to accept the conclusions without equivocation. Further research is essential to ferret out whether or not her conclusions are valid.

Calculating Self-conception Disparity

The principal method of calculating self-conception disparity, based on the research of Rogers and his associates, and the work of Achenbach and Zigler and their associates, has been the utilization of a "subtraction absolute value" formula (Stuart, 1990). This method is best described as calculating the amount of disparity between the ideal self-conception and the real self-conception, "taking the absolute value of the remainder when the ideal self-conception

response is subtracted from the real self-conception response" (Stuart, 1990, p. 11).

The first empirical endeavor in calculating self-conception disparity was suggested by Rogers and Dymond (1954). Their research in assessing self-conception disparity utilized a Q-sort technique with data collected from a clinical population. The findings of Rogers and Dymond were that a large self-conception disparity may be indicative of maladjustment, mental illness, or psychopathology (see also Block & Thomas, 1955; Hillson & Worchel, 1957; Scott, 1958).

Achenbach and Zigler (1963), using a random sample selection process and employing a subtraction-absolute value formula to calculate self-conception disparity, posited that greater disparity was a necessary condition for positive self-esteem and, consequently, the greater the overall level of psycho-emotional well-being. Their position is diametrically opposed to that offered by Rogers and Dymond.

The mere examination of the discrepancy in interpretations of these researchers engenders a sense of ambiguity (see Wylie, 1974, pp. 90-95). While both positions, when examined independent of the other, appear credible, their use of the same methodology, which produced conflicting results, may produce

confusion at a conceptual as well as a methodological level. It would seem that since self-esteem is such an important variable in the literature today, that research efforts would have been directed toward reconciling these two opposing views. However, until the work of Stuart, no such attempts had been made.

A Methodological Clarification of Self-Conception Disparity

Stuart (1990) was the first to attempt an integration of the theories by operationalizing James' ratio depiction of the evaluative process from which self-esteem is derived. It is suggested (Stuart, 1990) that the various interpretations of self-conception disparity derived from the subtraction-absolute value formula can be theoretically, as well as empirically, integrated by operationalizing James' ratio formula. Perhaps the idea of integrating the interpretations derived by Rogers and Dymond with those of Achenbach and Zigler and can be diagrammatically depicted as noted in Figure 2. For theoretical purposes, a "normal curve" has been used to illustrate the operationalization of James' formula (see figure 2).

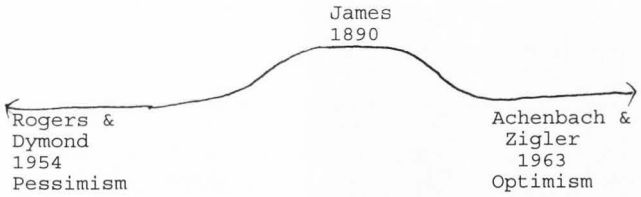


Figure 2. Diagrammatic integration of James' theory with that of Rogers & Dymond and Achenbach & Zigler.

The respondents in this study responded to a five-point Likert scale, and using the subtraction-absolute value formula to derive the amount of disparity, a subject may respond to the questions "I am and I should be more_____ (5)" and "I am and I should not be more_____(1)," and derive the same disparity score as he or she would in responding to the questions "I am not_____(1)" and "I should be more_____(5)." The calculation of the disparity score for either set of questions, using the subtraction-absolute value formula, would result in a disparity score of 4. On the other hand, by using the ratio formula and applying it to the same questions and having the same responses, the discrepancy would be a +.20 if the participant answered the respective questions with a 1 and a 5, and a + 5.0 if the participant answered the respective question with a 5 and a 1. The actual disparity scores

representing the range of possibilities for the subtraction-absolute value formula vs. the ratio formula, based on a five- point Likert Scale, are noted in Figure 3 (adopted with permission from Stuart, 1990; see figure 3, see also Appendix B, which gives the actual scores derived with the ratio formula vs. the subtraction-absolute value formula).

However, due to the lack of research in empirically testing this notion, it is difficult to suggest the true nature of the curve beyond what one might expect, given the present calculations. Hypothetically, however, it is assumed that the derived curve will digress from the normal curve when development and gender are taken into consideration.

Based on Stuart's (1990) study, it is suggested that the ratio formula permits for a wide range of scores and may allow the researcher to partial out individuals who may show large disparity and have psychopathology related thereto from those with large disparity and demonstrate positive emotional well-being. This differentiation is not possible with the subtraction-absolute value formula. Thus, a unique method of discrimination appears to be possible with the ratio formula, assuming its reliability and validity (Stuart, 1990).

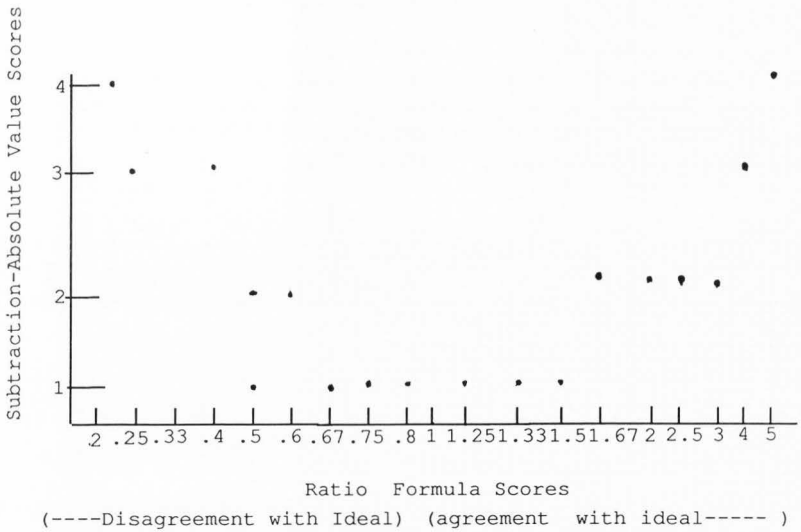


Figure 3. The convergence of scores when computed by the subtraction-absolute value formula and the ratio formula. (Adopted with permission from Stuart, 1990).

Purpose of the Study and Hypotheses

The purpose of this study is to replicate Stuart's (1990) study while addressing two primary limitations, namely: (a) the grouping of all subjects into one analysis, thereby eliminating the possibility of comparing the formulas across age groups; and (b) the analysis of the data for potential gender differences. An additional aspect of the study is to examine selected subscales of the Moos Family Environment using the subtraction-absolute value vs. the ratio formula. Initially, the same procedure will be used to ascertain if there is a difference in the amount of variance accounted for by the Moos Family Environment Scale when comparing the subtraction-absolute value formula with the ratio-formulas. Then, these subscales will be examined by age and gender to determine whether or not the ratio formula is better able to account for the variance than is the subtraction-absolute value formula.

Hypothesis One: Using the selected construct scales from Stuart's (1990) study, it is hypothesized that there will be no difference in the amount of variance obtained from the calculation of self-conception disparity for the selected substantive

variance obtained from the calculation of self-conception disparity for the selected substantive variables when comparing the subtraction-absolute value formula with the ratio formula taking age and gender into consideration.

Hypothesis Two: There will be no difference in the results obtained in the calculation of self-conception disparity for the Moos variables when comparing the subtraction-absolute value formula with the ratio formula.

Hypothesis Three: There will be no difference in the amount of variance obtained in the calculation of self-conception disparity for the Moos variables when comparing the subtraction-absolute value formula with the ratio formula, taking into consideration age and gender.

METHOD

Sample

Data for this study were collected by Dr. D. Kim Openshaw and associates working with The Self-Esteem Project during the 1987-1988 academic year. Prior to data collection, the project was reviewed and clearance was obtained from the Utah State University Institutional Review Board.

The sample consisted of 957 adolescents and young adults ranging in age from 10 to 25 [male (N = 340) and female (N = 617)]. Data were collected from middle and high school students living in Salt Lake County, Cache County, and Franklin County (Idaho) school districts. College students included in the study were sampled from General Education courses at Utah State University. While the subjects participating in the study were self-selected, thus composing a convenience sample, classes from which the students were sampled were randomly selected.

Subjects were divided into the following developmental groups according to age: early adolescence (10 to 14 years old), later adolescence (15 to 17 years old) and young adults (18 to 25 years old). Sample sizes for each of the developmental age groups

were 415 (males = 177 females = 238), 345 (males = 119 females = 226) and 197 (males = 44 females = 153), respectively. For the purpose of this study, the 18- to 25-year-old group was deleted from the study due to inconsistent reporting.

Procedures

Various school districts from a variety of counties were initially identified for participation. It was the intent to obtain as heterogeneous a sample as possible. Unfortunately some school districts were not permitting outside researchers to come into their school districts. By virtue of elimination, the school districts willing to participate in the project resulted in three Utah school districts (Granite, Cache, and Logan City) and one Idaho school district (Franklin). A random sample of available classes was drawn from school districts where permission was obtained from the superintendent (or responsible individual) and from the principals of the respective junior high, middle school, and high schools.

Teachers from the selected classes were contacted, a short description of the research project was given, and their permission to have their class participate was requested. Teachers willing to participate signed a

and their permission to have their class participate was requested. Teachers willing to participate signed a letter of informed consent (see Appendix B). It was further requested of teachers willing to permit their classes to participate, that the graduate students involved in the project be permitted to visit the class on a mutually agreeable date to explain the project to the class. All students desirous of participating signed a letter of informed consent, which was clarified to them in the presentation, and were given a letter of informed consent (see Appendix B) to give to their parents. This letter explained the basics of the project and requested a signature from the parents permitting their adolescent to participate. Those students returning the letters of informed consent were then given the inventory to take home, complete, and return to the school teacher.

Instrument

The questionnaire was entitled "Student Questionnaire" and consisted of easy-to-read printing in an 8 1/2" by 5 1/2" booklet. Participants were requested to respond to the self-conception items according to a five-point Likert-type scale consisting of: 1= Strongly Agree, 2= Agree, 3= Undecided, 4=

was assigned to ensure confidentiality. In order to ensure self-perception accuracy, parents were encouraged not to discuss the items with their adolescent prior to completion of the survey and to permit their adolescent to answer the survey questions according to his/her own dictates.

Relevant exogenous data were provided by parents of the subjects by completing the "Questionnaire for Parents/Guardians of Participating Students." College age subjects were asked to complete this portion of the questionnaire in lieu of their parents. Data collected in this portion of the questionnaire included information such as family size, marital status of the parent(s), socioeconomic status, and grade point average of the participating student.

Incorporated Measures Relevant to the Present Study.

Self-referent instruments. Several self-referent (i.e., self-esteem or self-conception) instruments were used in the present study and incorporated into the body of the questionnaire completed by the participants. The Rosenberg Self-Esteem Scale (1965) is a widely respected measure of self-esteem with a reported reliability coefficient of .92 when used in its entirety (in the student questionnaire nine items

reported reliability coefficient of .92 when used in its entirety (in the student questionnaire nine items were incorporated from the Rosenberg Self-Esteem Scale). Factor analysis of the Rosenberg Self-Esteem Scale results in a two-factor solution, self-esteem and self-derogation, with Chronbach Alpha's of .80 and .71, respectively (Openshaw, 1978; Openshaw, Thomas, & Rollins, 1981). The second measure is the Osgood Self-Esteem Semantic Differential, which has a two-factor solution and Chronbach Alpha's of .72 for social competence and .74 for social worth (Openshaw, 1978; Openshaw, Thomas, & Rollins, 1981). The third measure was developed for use in a previous study (Stuart, 1990) by Openshaw and is referred to as the Openshaw Self-Concept Scale. This measure consists of eight subscales. The subscales are titled philosophy of life (6 items), mood (23 items), security (16 items), personal (12 items), self-confidence (23 items), peers (27 items), parents (5 items), and self-control (12 items). The subscales are composed of positive real, negative real, ideal, and self-esteem statements. It was specifically designed to include self-concept and self-esteem items for comparative purposes.

Instruments Depicting External Constructs Related to Self-Esteem (Psychoemotional Well-Being Variables)

To evaluate findings relevant to this study, several instruments were included against which comparisons could be made regarding the derivation of self-conception disparity (i.e., subtraction-absolute value formula and the ratio formula) and related external variables. The revised UCLA Loneliness Scale (Russell, Peplau, & Lutrona, 1980) reported an internal consistency coefficient of .94. All 20 items were used in the questionnaire. The second instrument was the Beck Depression Inventory (Beck, Rush, Shaw, & Emery, 1974). This instrument is frequently used in clinical settings and has been empirically validated. Beck et al. (1974) reported an .86 reliability coefficient. All 20 items were incorporated into the study. The third measure was a six-item suicidal ideation scale (Devries, 1966).

Instruments Depicting External Constructs Related to Self-Esteem (Family Environmental Variables)

Selected for inclusion in this study as a measure of family environment is the Moos Family Environment Scale (Moos & Moos, 1974). This instrument consists of 90 items and is represented in the literature as having

a Chronbach Alpha measure of reliability ranging from .68 for the independence dimension to .86 for the cohesion dimension. Stability coefficients were also calculated for the Moos, the stability coefficient for a 4-month interval was .78, for a 12 month interval the coefficient was .71. For this study the "Student Questionnaire" included 53 items, representing six of the Moos scales, namely, cohesion, expression, conflict, independence, organization, and control.

The overall questionnaire utilized in the study was constructed so that all items were randomly distributed throughout the questionnaire. This was felt to be particularly important with the self-concept and associated self-esteem items to avoid any presentation of reading bias being introduced into the research findings.

RESULTS

Reliability

Reliability Estimates for the Positive-Real, Negative-Real and Ideal Items: Openshaw Self-Concept Scale (OSCS)

Three formula variations, the positive-real, the negative-real, and ideal, are necessary for the operationalization of James' (1890) formula. The first two variations are directly related to James' notion of successes (real), whereas the latter is specific to James' formulation of pretensions (ideal). In order to evaluate the internal consistency of the three possible component constructs, using subject responses to the OSCS, reliability coefficients were computed for each in a manner consistent with that suggested by Stuart (1990). Table 1 summarizes the internal consistency for the three formulas.

Table 1

Reliability Estimates (Alpha) for the Three Formulas

Components	Alpha	Number of items used
Positive-real items	.8667	23
Negative-real items	.8775	23
Ideal items	.9103	23

Results of the analyses presented in Table 1 indicate strong internal consistency, accounting for 75 to 83 % of the variance. The alpha coefficients are identical to those reported by Stuart (1990), indicating that the original data were not altered in any way.

OSCS Subscale Reliability Estimates

Reliability coefficients were calculated for the eight subscales of the Openshaw Self-Concept Scale. These subscales comprise the independent variables against which the two methods of calculating self-conception disparity were compared and contrasted. Because the subscale "Philosophy" consisted of only one item, it was not included in the reliability analysis. Results of the analysis are presented in Table 2.

Table 2

Reliability Estimates (Alpha) for the Eight Subscales

Independent Variable	Subtraction-absolute Value	Pos.-Real Ratio	Neg.-Real Ratio
Mood	.4006	.6796	.6929
Self-confidence	.5938	.6060	.6117
Self-control	.3756	.4310	.4290
Security	.5198	.5276	.6111
Personal	.4448	.4480	.4708
Peer	.5388	.5264	.6275
Parents	.6294	.7377	.6998
Philosophy	(Only one item in scale)		

Comparing the two subscales and the formulas for calculating self-conception disparity, it is noted in Table 2 that there is a difference in the reliability coefficients depending on whether they were obtained vis-a-vis the subtraction-absolute value formula or the ratio formula. In all but one case there is greater internal consistency when computed from the positive-real ratio formula. The negative-real ratio resulted in all internal consistency coefficients being greater than those calculated from the subtraction-absolute value formula. In only two of the cases (Mood and Parents) was there a substantial, though not necessarily significant, difference in the obtained alpha.

These results suggest that the internal reliability of the scales are average or above for this population. It is likely that the alphas obtained have been affected by grouping all ages and gender together in one analysis.

Analysis of the Reliability of Seven Construct-Related Scales

Reliability estimates were calculated for the seven selected construct scales (i.e. Rosenberg Self-Esteem Scale, Osgood Semantic Differential, [OSD],

Openshaw Self-Concept Scale [OSCS], Suicide Ideation Scale, UCLA Loneliness Scale, Beck Depression Inventory, and the Moos Family Environment Scale). Results summarized in Table 3 suggest strong internal consistency for each of the seven instruments.

Table 3

Reliability Estimates (Alpha) for Seven Construct-Related Scales

Dependent Variables	Alpha	Number of Items included	Number of Items deleted
Openshaw	.8342	23	0
Rosenberg	.8139	8	2
Osgood	.8212	33	0
UCLA	.8228	20	0
Suicide	.7711	4	2
Beck Depression	.8473	19	1
Moos	.8336	46	0

Validity

Face Validity

Face validity for this study has been previously established by Stuart (1990). As such, and inasmuch as this is a replication and further exploration of Stuart's study, no further face validity analyses were deemed relevant.

Construct Validity

Zero order correlations were computed for the seven construct-related scales. The names of the seven construct-related scales were abbreviated in Table 4 as follows: OSD is the Osgood Semantic Differential; OSCS is the Openshaw Self-Concept Scale; UCLA is the UCLA Loneliness Scale; Beck is the Beck Depression Inventory; RSBG is the Rosenberg Self-Esteem Scale; SI is the Suicide Ideation Scale; and Moos is the Moos Family Environment Scale.

Table 4

Zero Order Correlations for the Seven Construct Related Scales

	OSD	OSCS	UCLA	Beck	RSBG	SI	Moos
OSD	1.00	.3461**	.3195**	.3027**	.0541	.2392**	.0665*
OSCS		1.00	.4795**	.7816**	.3238**	.5130**	.2311**
UCLA			1.00	.4632**	.0829*	.3963**	.2694**
Beck				1.00	.2858**	.6405**	.0515
RSBG					1.00	.1006**	.0506
SI						1.00	.0756*
Moos							1.00

* = $p < .05$
**= $p < .01$

These results on the surface suggest that there is a significant relationship between most of the instruments. This interpretation, however, may be spurious in that the large "N" would create significant correlations even though the amount of variance is minimal. It is suggested that unless the correlations account for more that 80% of the variance (r = .8945) the scales are not measuring the same phenomenon. The results suggest only two correlations approach significance (r = .8945), namely, OSCS and the Beck Depression Scale and the Beck Depression Scale and the Suicidal Ideation Scale. These data suggest that further work in assessing construct validity is warranted. A recommendation for further research would be to take each item of the OSCS and correlate them with the items of each of the other scales.

Testing of the Hypothesis

Stuart (1990) demonstrated that the two methods of calculating self-conception disparity are not, at least empirically, related. In fact, there is a strong suggestion that the two methods may also be theoretically different and perhaps examine different self-referent phenomena. With this in mind, the present study re-examines Stuart's findings but doing so by taking age and gender into consideration.

Hypothesis One: Using the selected construct scales from Stuart's (1990) study, it is hypothesized that there will be no difference in the results obtained from the calculation of self-conception disparity for the selected substantive variables when comparing the subtraction-absolute value formula with the ratio formula when taking age and gender into consideration. Stuart (1990) demonstrated that the ratio formulas accounted for more of the variance than did the subtraction-absolute value formula. However, Stuart pooled her data and did not take into consideration the effect of age or gender. To provide a more accurate understanding of how these two variables affect the calculation of self-conception disparity, the present study examined early (10 to 14 years of age) and later (15 to 17 years of age)

adolescents, but also differentiated each age group by gender.

In evaluating Hypothesis One, the eight subscales of the Openshaw Self-Concept Scale (OSCS) were regressed on the five criterion-related scales, namely the UCLA Loneliness Scale (UCLA), Rosenberg Self-Esteem Scale (RSBG), Suicide Ideation Scale (SI), Osgood Semantic Differential (OSD), and the Beck Depression Inventory (Beck). [It should be noted that the initial analyses, using both the positive real and the negative real formulas, indicated that both formulas accounted for approximately the same amount of variance. Consequently the results that follow only report the positive-real ratio formula to be consistent with the results reported by Stuart]. Also since there was virtually no difference in the amount of variance accounted for by the two formulas, each regression analysis was calculated by age and gender. Findings are reported in Tables 5 through 14.

Table 5

Regression of the Eight Subscales of the OSCS on the UCLA Loneliness Scale for 10- to 14-year-old Males and Females, Respectively, for Two Disparity Formulas

Males

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	-.056497	-.690	.4910
Personal	-.083571	-1.180	.2398
Philosophy	.270854	3.450	.0007
Self-Control	.284641	-4.116	.0001
Security	.006406	.082	.9346
Peers	.498499	6.123	.0000
Mood	-.083719	-1.029	.3052
Parents	.199444	2.212	.0283
			R Square= .44961

Positive-Ratio Formula

	Beta	F	Significant F
Self-Confidence	.414948	4.800	.0000
Personal	-.081324	-1.033	.3031
Philosophy	-.338134	-4.633	.0000
Self-Control	.013708	.174	.8621
Mood	-.125528	-1.558	.1210
Peers	.208532	2.619	.0096
Parents	.301044	3.754	.0002
Security	-.053116	-.663	.5278
			R Square=.37084

Females

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	.025694	.264	.7923
Philosophy	-.001984	-.027	.9782
Personal	.067004	.900	.3693
Self-Control	.009721	.129	.8978
Mood	.134120	1.776	.0771
Parents	-.147100	-1.903	.0584
Peers	-.174302	-2.136	.0337
Security	.114689	1.353	.1774
			R Square=.05256

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	.213093	2.300	.0224
Philosophy	.026174	.377	.7069
Peers	.215338	3.071	.0024
Personal	-.139604	-1.894	.0594
Self-Control	-.069908	-.936	.3504
Parents	-.058208	-.755	.4511
Security	.023820	.277	.7817
Mood	.158908	1.799	.0734
			R Square=.14622

Table 6

Regression of the Eight Subscales of the OSCS on the Rosenberg Self-Esteem Scale for 10- to 14-year-old Males and Females, Respectively, for Two Disparity Formulas

Males

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	-.200449	-1.149	.1616
Philosophy	.084012	.635	.5280
Parents	-.147519	-1.145	.2571
Self-Control	-.048457	-.367	.7152
Mood	.052277	.385	.7018
Peers	.356163	2.439	.0179
Personal	.058740	.404	.6875
Security	.148904	1.108	.3131

R Square=.19131

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	-.056835	-.334	.7395
Personal	-.105320	-.727	.4700
Parents	.149092	1.111	.2714
Philosophy	.106834	.769	.4453
Self-Control	.070597	.463	.6451
Peers	.065727	.444	.6548
Mood	.239764	1.545	.1279
Security	.168658	1.009	.3174

R Square=.23702

Females

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	.260205	2.093	.0391
Philosophy	-.106746	-1.035	.3036
Mood	.189289	1.730	.0870
Personal	.157161	1.512	.1339
Self-Control	-.155582	-1.126	.2630
Parents	-.020321	-.190	.8495
Peers	-.090024	-.831	.4079
Security	.075861	.659	.5115

R Square=.17245

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	.365934	3.048	.0030
Philosophy	-.108011	-1.207	.2304
Peers	.067524	.737	.4630
Personal	.074040	.776	.4398
Parents	.066971	.676	.5005
Security	-.003507	-.034	.9731
Self-Control	-.143776	-1.451	.1503
Mood	.269781	2.355	.0206

R Square=.34226

Table 7

Regression of the Eight Subscales of the OSCS on the Suicide Ideation Scale for 10- to 14-year-old Males and Females, Respectively, for Two Disparity Formulas

Males

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	-.043692	-.444	.6579
Personal	-.207638	-2.433	.0160
Philosophy	.206556	2.187	.0302
Self-Control	-.106775	-1.283	.2012
Security	.074525	.795	.4278
Peers	.333288	3.402	.0008
Mood	-.049624	-.507	.6131
Parents	.070351	.648	.5176
			R Square=.20311

Positive-Ratio Formula

	Beta	F	Significant F
Self-Confidence	.262712	2.803	.0057
Personal	-.186228	-2.182	.0305
Philosophy	-.101414	-1.282	.2017
Self-Control	-.036097	-.422	.6733
Mood	.192781	2.208	.0286
Peers	.206255	2.390	.0180
Parents	.175381	2.018	.0452
Security	-.049245	-.541	.5892
			R Square=.26055

Females

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	.064264	.465	.6422
Philosophy	-.046264	-.648	.5174
Personal	.048052	.639	.5232
Self-Control	-.067605	-.877	.3814
Mood	.019734	.256	.7981
Parents	-.012601	-.160	.8732
Peers	-.073853	-.364	.7162
Security	-.055695	-.644	.5202
			R Square=.01404

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	-.071632	-.871	.3845
Philosophy	-.010442	-.169	.8657
Peers	.069217	1.113	.2670
Personal	-.021021	-.322	.7481
Self-Control	.167081	2.532	.0120
Parents	.261339	3.820	.0002
Security	.137258	1.802	.0729
Mood	.222522	2.839	.0049
			R Square=.32789

Table 8

Regression of the Eight Subscales of the OSCS on the Suicide Ideation Scale for 10- to 14-year-old Males Utilizing the Square Root Transformation [1] for Two Disparity Formulas

	Subtraction-Absolute Value		
	Beta	F	Significant F
Mood	-.042779	-.413	.6804
Self-Control	-.116622	1.324	-.1873
Peers	-.362329	3.147	.0020
Personal	-.189928	-2.105	.0368
Security	-.015642	-.156	.8764
Philosophy	.076692	.767	.4441
Self-Confidence	-.035951	-.345	.7306
Parents	.037752	.329	.7428
			R Square =.10723

	Positive-Ratio		
	Beta	F	Significant F
Mood	.120020	2.663	.0085
Philosophy	.080838	.537	.5917
Personal	-.182411	-2.187	.0301
Self-Confidence	.084053	2.175	.0310
Self-Control	-.095493	-1.242	.2158
Peers	.134837	2.467	.0146
Parents	.129012	2.330	.0210
Security	.066491	1.261	.2089
			R Square = .35163

Table 9

Regression of the Eight Subscales of the OSCS on the Osgood Semantic Differential for 10- to 14-year-old Males and Females, Respectively, for Two Disparity Formulas

Males

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	-.132242	-1.293	.1978
Personal	-.052202	-.590	.5561
Philosophy	.054236	.553	.5810
Self-Control	-.159661	-1.848	.0664
Security	9.368E-04	.010	.9923
Peers	.447664	4.401	.0000
Mood	-.074564	-.733	.465
Parents	-.089058	-.952	.3426

R Square=.14081

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	.058824	.574	.5665
Personal	-.032613	-.350	.7271
Philosophy	-.093964	-1.087	.2788
Self-Control	.042869	.459	.6468
Mood	.025331	.265	.7910
Peers	.145207	1.539	.1256
Parents	.029283	.308	.7583
Security	.203694	2.048	.0421

R Square=.11665

Females

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	.030469	.314	.7538
Philosophy	.026547	.368	.7134
Personal	.133069	1.795	.0740
Self-Control	-.031167	-.414	.6790
Mood	-.041638	-.554	.5802
Parents	-.215177	-2.796	.0056
Peers	-.096947	-1.194	.2338
Security	.007391	.088	.9303

R Square=.06139

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	.194703	2.190	.0296
Philosophy	.080534	1.207	.2286
Peers	.140262	2.085	.0382
Personal	.103522	1.464	.1446
Self-Control	.200572	2.798	.0056
Peers	-.085246	-1.152	.2506
Security	.099768	1.211	.2273
Mood	-.110623	-1.301	.1947

R Square= .21378

Table 10

Regression of the Eight Subscales of the OSCS on the Beck Depression Inventory for 10- to 14-year-old Males and Females, Respectively, for Two Disparity Formulas

Males

	Subtraction-Absolute Value		
	Beta	F	Significant F
Self-Confidence	-.109557	-1.146	.2535
Personal	-.127436	-1.540	.1254
Philosophy	.193040	2.105	.0368
Self-Control	-.067794	-.839	.4025
Security	.164459	1.804	.0731
Peers	.463109	4.870	.0000
Mood	-.133752	-1.407	.1613
Parents	-.074187	-.704	.48226
			R Square=.24912

	Positive-Ratio		
	Beta	F	Significant F
Self-Confidence	.315469	3.638	.0004
Personal	-.145531	-1.843	.0671
Philosophy	-.070799	-.967	.3350
Self-Control	.022878	.289	.7727
Mood	.198859	2.461	.0149
Peers	.217901	2.728	.0070
Parents	.226206	2.812	.0055
Security	-.133343	-1.583	.1153
			R Square=.36677

Females

	Subtraction-Absolute Value		
	Beta	F	Significant F
Self-Confidence	-.059247	-.618	.5371
Philosophy	-.248626	-3.486	.0006
Personal	.063487	.867	.3870
Self-Control	-.006974	-.094	.9253
Mood	.170671	2.298	.0225
Parents	.013112	.172	.8632
Peers	.072769	.907	.3653
Security	-.044156	-.530	.5968
			R Square=.08394

	Positive-Ratio		
	Beta	F	Significant F
Self-Confidence	-.173455	-1.814	.0710
Philosophy	.102134	1.797	.0737
Peers	.094339	1.646	.1012
Personal	.012040	.200	.8418
Self-Control	.197937	3.240	.0014
Peers	.204229	3.239	.0014
Security	.095740	1.364	.1741
Mood	.344928	4.775	.0000
			R Square=.42917

The findings reported in Tables 5 through 10 indicate that a greater proportion of the variance is accounted for by the ratio formula than the subtraction-absolute value formula. This was true for all cases except 10-to 14-year-old males when the analysis involved the UCLA Loneliness Scale (Table 5). In this case a greater amount of the variance was accounted for by the subtraction-absolute value formula (R2 = .44961) than the positive-ratio formula (R2 = .37084). While the majority of the findings suggest that the null hypothesis can be rejected in favor of the ratio formula, continued research is suggested due to the fact that in some instances the variance was only slightly improved and in the one case the ratio formula did not account for a greater amount of variance.

The following Tables (11-15) summarize the results obtained for 15-to 17-year-old males and females examining regressions across each of the five construct-related scales.

Table 11

Regression of the Eight Subscales of the OSCS on the UCLA Loneliness Scale for 15- to 17-year-old Males and Females, Respectively, for Two Disparity Formulas

	Beta	F	Significant F
Males			
Subtraction-Absolute Value			
Self-Confidence	.199039	.428	.6731
Philosophy	-.566478	-1.912	.0703
Personal	.476166	1.523	.1433
Mood	.327626	1.200	.2441
Peers	-.141689	-.418	.6805
Parents	-.371722	-1.136	.2694
Self-Control	.093915	.250	.8049
Security	.198348	.513	.6138
			R Square=.37765
Positive-Ratio			
Self-Confidence	.488866	1.592	.1271
Parents	.012274	.063	.9505
Personal	-.260554	-1.204	.2428
Philosophy	.010615	.048	.9622
Self-Control	-.056073	-.217	.8304
Peers	-.071380	-.303	.7654
Security	-.124869	-.374	.7124
Mood	.263925	.661	.5160
			R Square=.31794
Females			
Subtraction-Absolute Value			
Self-Confidence	-.052052	-.358	.7215
Personal	.032801	.290	.7733
Philosophy	.147390	1.283	.2056
Mood	.145561	1.197	.2371
Parents	-.122977	-1.088	.2820
Self-Control	-.246671	-2.110	.0401
Peers	.125161	.893	.3765
Security	.532241	3.196	.0025
			R Square=.51170
Positive-Ratio			
Self-Confidence	-.111874	-.661	.5118
Philosophy	-.112271	-.918	.3633
Personal	-.028948	-.245	.8076
Peers	.651083	5.185	.0000
Self-Control	.178074	1.312	.1958
Mood	.185222	1.291	.2030
Parents	-.133892	-.979	.3324
Security	-.052786	-.360	.7207
			R Square=.52203

Table 12

Regression of the Eight Subscales of the OSCS on the Rosenberg Self-Esteem Scale for 15- to 17-year-old Males and Females, Respectively, for Two Disparity Formulas

Males

	Subtraction-Absolute Value		
	Beta	F	Significant F
Self-Confidence	.947398	2.054	.2884
Peers	-.478730	-1.803	.3224
Personal	-.337363	-1.419	.3909
Philosophy	.803106	3.892	.1601
Mood	.427365	2.278	.2634
Parents	-.870711	-3.333	.1865
Self-Control	-.763518	-2.162	.2758
Security	.377876	.940	.5197
			R Square=.98362

	Positive-Ratio		
	Beta	F	Significant F
Self-Confidence	.826685	6.434	.0982
Philosophy	-.022728	-.220	.8623
Peers	-.044071	-.780	.5783
Self-Control	-.973082	5.588	.1172
Parents	1.224656	12.100	.0525
Personal	-.879096	-6.406	.0986
Security	.991119	6.693	.0944
Mood	-.168008	-1.020	.4937
			R Square=.99748

Females

	Subtraction-Absolute Value		
	Beta	F	Significant F
Self-Confidence	.192688	.854	.4036
Philosophy	-.059754	-.263	.7955
Peers	-.301303	-1.283	.2148
Personal	.227270	1.068	.2988
Security	-.097540	-.346	.7330
Self-Control	-.009909	-.042	.9667
Parents	-.036066	-.148	.8839
Mood	.167119	.595	.5588
			R Square=.244401

	Positive-Ratio		
	Beta	F	Significant F
Self-Confidence	.025208	.100	.9213
Mood	.118848	.595	.5590
Philosophy	.188249	.910	.3740
Personal	.537066	2.706	.0140
Peers	-.192822	-.904	.3774
Self-Control	.227344	1.035	.3136
Security	-.160999	.631	.5358
Parents	.288039	-1.027	.3172
			R Square=.48296

Table 13

Regression of the Eight Subscales of the OSCS on the Suicide Ideation Scale for 15- to 17-year-old Males and Females, Respectively, for Two Disparity Formulas

Males

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	.726140	1.376	.1840
Philosophy	-.008863	-.026	.9792
Personal	.201025	.567	.5773
Mood	.105369	.340	.7373
Peers	.113046	.294	.7720
Parents	-.604289	-1.627	.1193
Self-Control	-.420156	-.987	.3355
Security	-.418540	-.953	.3519
			R Square= .19839

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	.295647	1.167	.2570
Parents	.208221	1.192	.2109
Personal	.272302	4.702	.0006
Philosophy	-.407976	-2.234	.0307
Self-Control	-.060684	-.285	.7789
Peers	-.205444	-1.055	.3038
Security	.317287	1.152	.2630
Mood	-.267143	-.811	.4268
			R Square=.53568

Females

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	.394699	1.864	.0684
Personal	-.126327	-.863	.3922
Philosophy	-.297643	-2.005	.0506
Mood	.013986	.089	.9294
Parents	.035689	.244	.8080
Self-Control	-.215503	-1.427	.1602
Peers	-.118861	-.656	.5149
Security	.083041	.177	.8604
			R Square=.18490

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	.506983	2.877	.0060
Philosophy	.280594	2.203	.0324
Personal	.133207	1.082	.2846
Peers	-.099946	-.764	.4484
Self-Control	.063268	.448	.6564
Mood	.198514	1.329	.1902
Parents	-.056265	-.395	.6944
Security	-.143453	-.939	.3526
			R Square=.48190

Table 14

Regression of the Eight Subscales of the OSCS on the Osgood Semantic Differential for 15- to 17-year-old Males and Females, Respectively, for Two Disparity Formulas

Males

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	.666017	1.941	.0665
Philosophy	-.751147	-3.436	.0026
Personal	.158139	.686	.5009
Mood	-.232404	-1.154	.2622
Peers	.052749	.211	.8352
Parents	-.023383	-.097	.9238
Self-Control	-.158658	-.573	.5730
Security	.184064	.645	.5264

R Square=.66109

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	.570335	2.986	.0073
Parents	-.106853	-.880	.3894
Personal	-.167860	-1.247	.2269
Philosophy	.108911	.791	.4381
Self-Control	-.347118	-2.159	.0432
Peers	.178998	1.220	.2367
Security	-.364367	-1.754	.0947
Mood	.533438	2.149	.0441

R Square=.73612

Females

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	-.257770	-1.656	.1042
Personal	-.022860	-.188	.8514
Philosophy	-.156522	-1.271	.2098
Mood	.017796	.137	.8919
Parents	.029989	.248	.8055
Self-Control	-.079482	-.634	.5290
Peers	.082075	.546	.5875
Security	.765132	4.286	.0001

R Square=.43898

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	-.029832	-.168	.8672
Philosophy	.008739	.068	.9459
Personal	-.105084	-.848	.4006
Peers	.565307	4.295	.0001
Self-Control	.115622	.813	.4204
Mood	.208709	1.388	.1717
Parents	.052027	.363	.7181
Security	-.017076	-.111	.9121

R Square=.47497

Table 15

Regression of the Eight Subscales of the OSCS on the Beck Depression Inventory for 15- to 17-year-old Males and Females, Respectively, for Two Disparity Formulas

	Beta	F	Significant F
Males			
Subtraction-absolute value			
Self-Confidence	.795226	1.785	.0894
Philosophy	-.629909	-2.216	.0384
Personal	.113817	.380	.7080
Mood	.003863	.015	.9884
Peers	.096314	.296	.7700
Parents	-.915043	-.623	.5405
Self-Control	-.260491	-.725	.4770
Security	-.171865	-.464	.6479
			R Square=.42859
Positive-Ratio			
Self-Confidence	.987626	4.696	.0001
Parents	.051750	.387	.7029
Personal	.047917	.323	.7499
Philosophy	.021022	.139	.8911
Self-Control	-.294437	-1.663	.1119
Peers	-.151816	-.940	.3586
Security	.127694	.558	.5828
Mood	-.096282	-.352	.7284
			R Square=.68007
Females			
Subtraction-Absolute Value			
Self-Confidence	-.038561	-.213	.8326
Personal	.044274	.313	.7557
Philosophy	.072142	.503	.6175
Mood	.126843	.835	.4078
Parents	-.144944	-1.026	.3099
Self-Control	-.355405	-2.433	.0188
Peers	.073416	.419	.6771
Security	.255524	1.228	.2255
			R Square=.23766
Positive-Ratio			
Self-Confidence	.063303	.394	.6956
Personal	.074404	.640	.5251
Philosophy	.148684	1.323	.1919
Mood	.156641	1.313	.1955
Parents	.009574	.074	.9411
Self-Control	.418709	3.070	.0035
Peers	.242948	1.870	.0676
Security	-.063939	-.458	.6487
			R Square=.56841

Results listed in Table 17 suggest that the subtraction-absolute value formula accounts for a greater amount of the variance for males ages 15 to 17, (R2 = .37765) than the positive-real formula (R2 = .31794), when examining the UCLA Loneliness Scale. The null hypothesis is rejected in this case in favor of the subtraction-absolute value formula.

For the regression of the OSCS on the UCLA Loneliness Scale for 15-to 17-year-old females the findings indicate (see Table 17) that there is insignificant difference in the amount of variance accounted for between the two formulas, subtraction-absolute value formula (R2 = .511170) and the positive-ratio formula (R2 = .52203). This is also true for the 15 to 17 year old males for the Rosenberg Self-Esteem Scale (see Table 18) where the subtraction-absolute value formula accounts for an R2 of .98362, whereas the positive-real ratio formula accounts for an R2 of .99748. It is also important to note that the amount of variance (96.7% and 99.5%, respectively) accounted for in this one analysis may be due to the fact that one self-esteem scale is being regressed on another. It is further pointed out that since the results for the males are different from that obtained from the same age females, these results must be interpreted with

caution. In any case the null hypothesis is accepted since the variance accounted for is virtually the same.

Regarding the remaining analyses, Tables 19 through 21, the findings indicate that the variance accounted for is greater when the positive-ratio formula is used. Consequently, the null hypothesis is rejected in favor of the positive-ratio formula.

Assessing Normality: An Examination of the Two Methods of Calculating Self-Conception Disparity Against the Assumed Line of Normality

Because the data suggest that the two formulas are measuring different phenomena, relative to self-conception disparity, with minimal common variance, the question which arises is which of the two formulas more closely approximates the assumed line of normality when examined by age and gender. The line of normality is the line that is based on the assumptions of normality relevant to the projected hypothetical goodness of fit (Ott, Larson, & Mendenhall, 1983, pp. 387-390). An examination of the plot derived permits an understanding of how far the residuals deviate from statistical normalcy. The less the deviation, the better the goodness of fit. Findings related to the assumption of normalcy are depicted in Figures 4 through 24 (see figures 4 through 24).

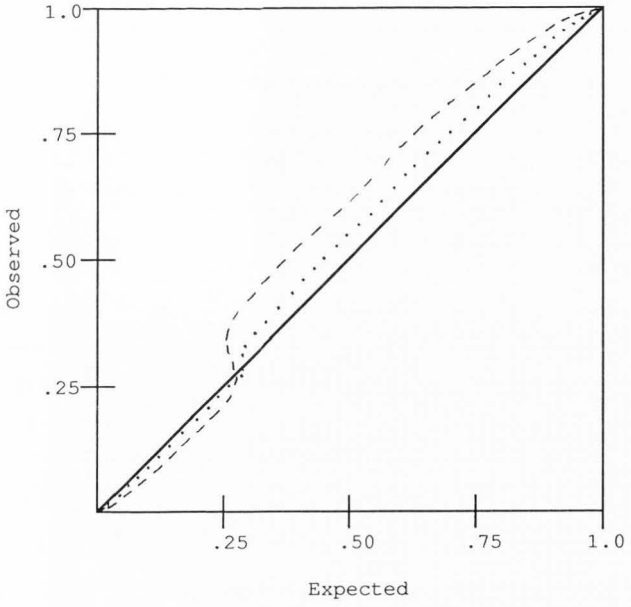
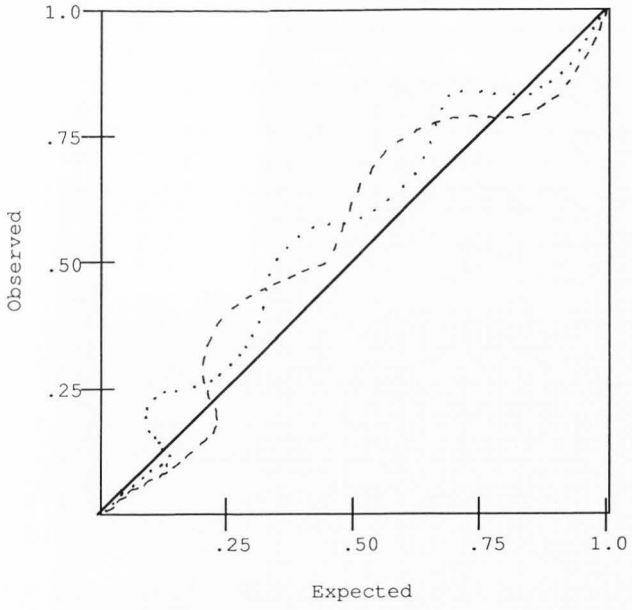


Figure 4. Normal probability plot comparison beteen the subtraction-absolute value formula and the positive-real ratio formula for the UCLA Loneliness Scale for 10- to 14-year-old males.



Subtraction-Absolute Value Formula ····

Positive-Real Ratio Formula - - - -

Figure 5. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the UCLA Loneliness Scale for 10- to 14 year-old-females

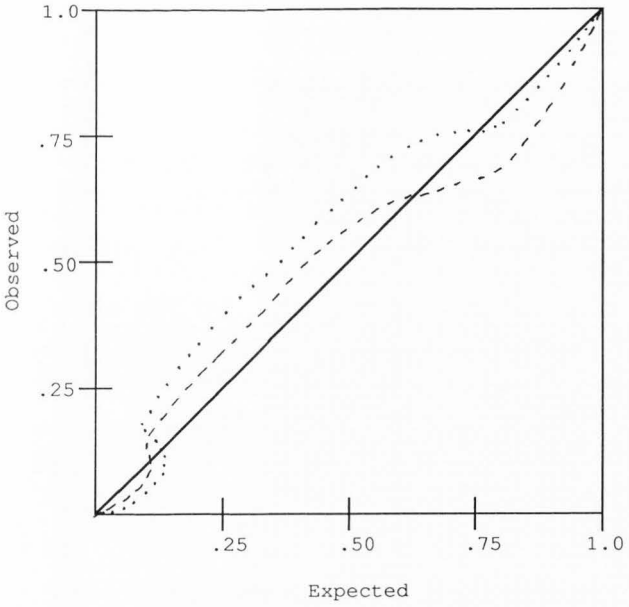


Figure 6. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Rosenberg Self-Esteem Scale for 10- to 14-year-old males.

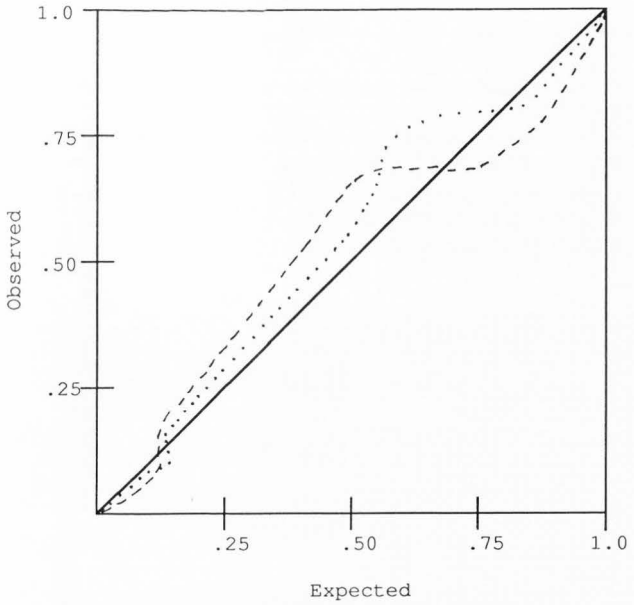
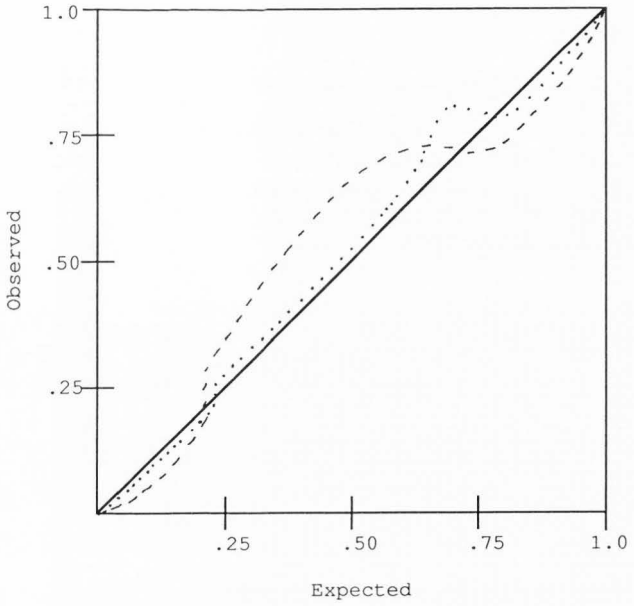


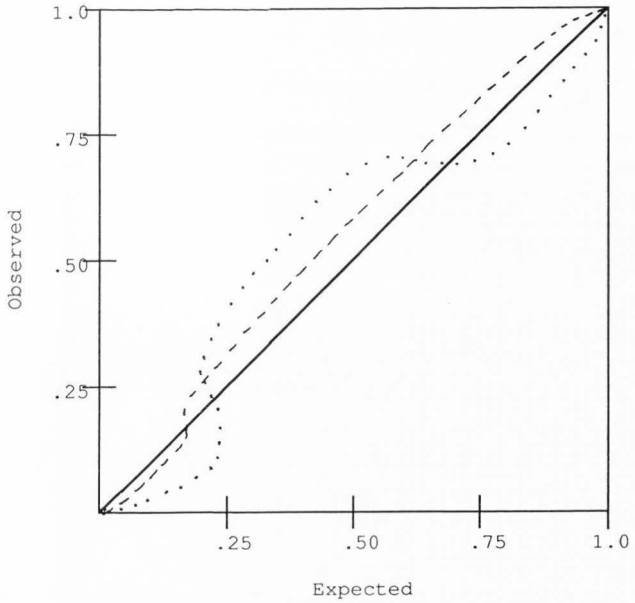
Figure 7. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Rosenberg Self-Esteem Scale for 10- to 14-year-old females.



Subtraction-Absolute Value Formula ····

Positive-Real Ratio Formula – – – –

Figure 8. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Suicide Ideation Scale for 10- to 14-year-old males.



Subtraction-Absolute Value Formula · · · ·

Positive-Real Ratio Formula - - - -

Figure 9. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Suicide Ideation Scale for 10- to 14-year-old females.

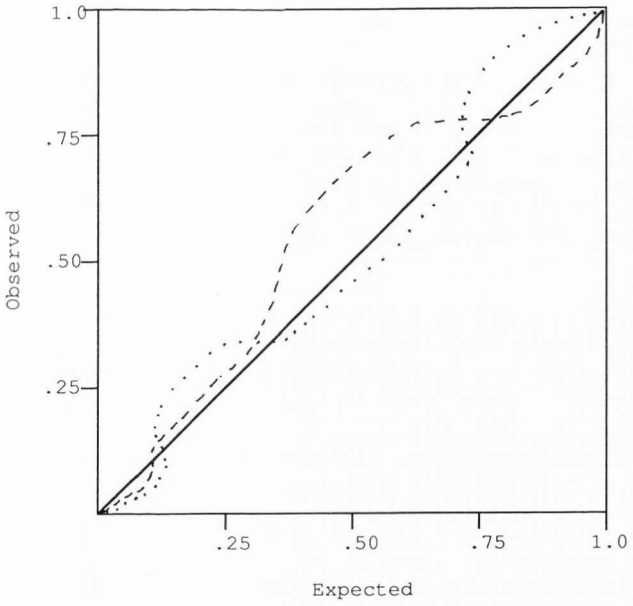
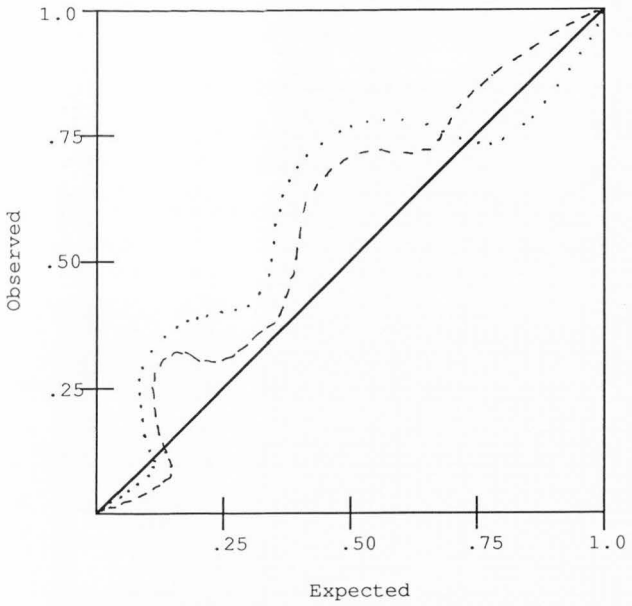


Figure 10. Normal probability plot comparison for the subtraction-absolute value formula and the positive-real ratio formula with the square root transformation for the Suicide Ideation Scale for 10- to 14-year-old males.



Subtraction-Absolute Value Formula ....

Positive-Real Ratio Formula - - - -

Figure 11. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Osgood Semantic Differential for 10- to 14-year-old males.

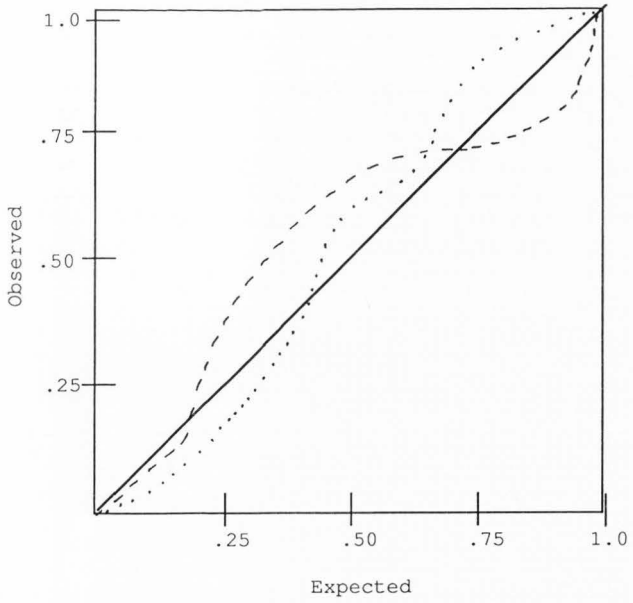


Figure 12. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Osgood Semantic Differential for 10- to 14-year-old females.

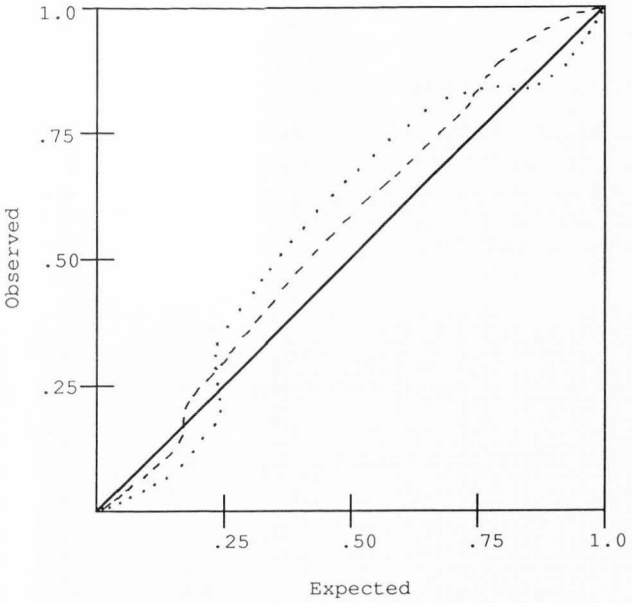
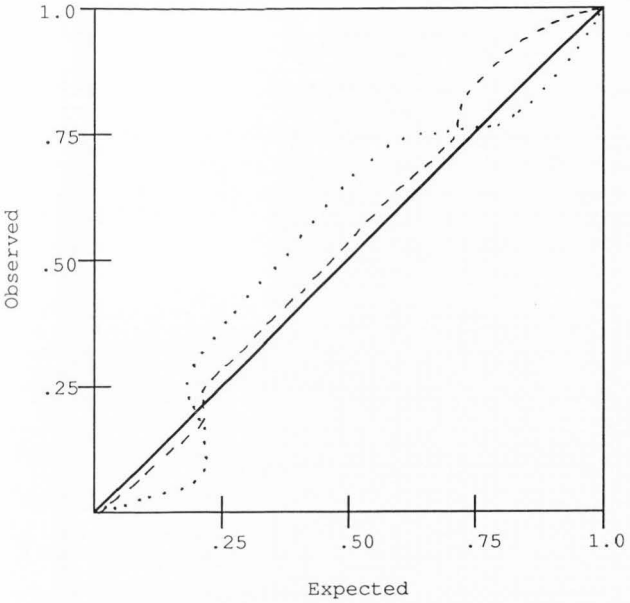


Figure 13. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Beck Depression Inventory for 10- to 14-year-old males.



Subtraction-Absolute Value Formula····

Positive-Real Ratio Formula– – – –

Figure 14. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Beck Depression Inventory for 10- to 14-year-old females.

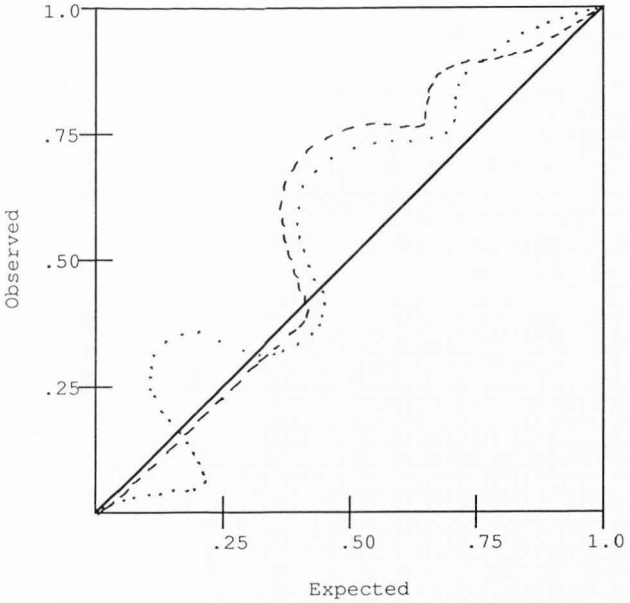


Figure 15. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the UCLA Loneliness Scale for 15- to 17-year-old males.

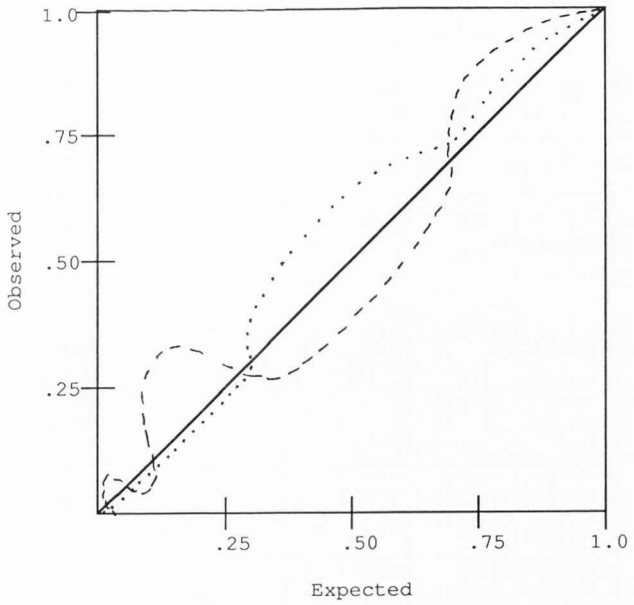


Figure 16. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the UCLA Loneliness Scale for 15- to 17-year-old females.

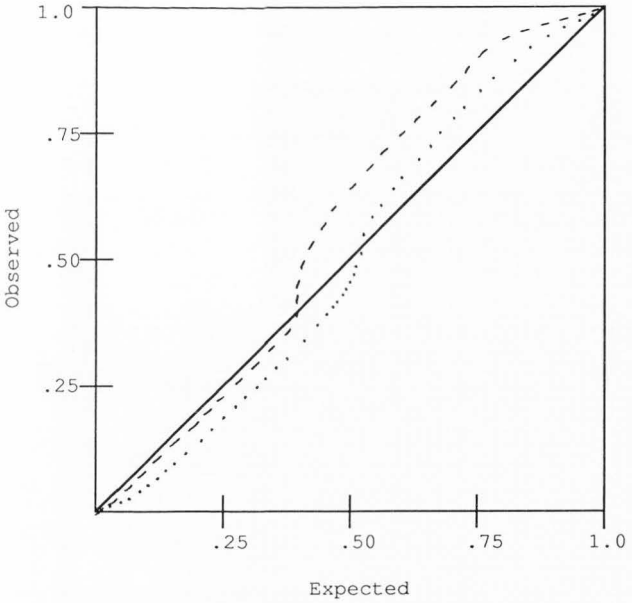
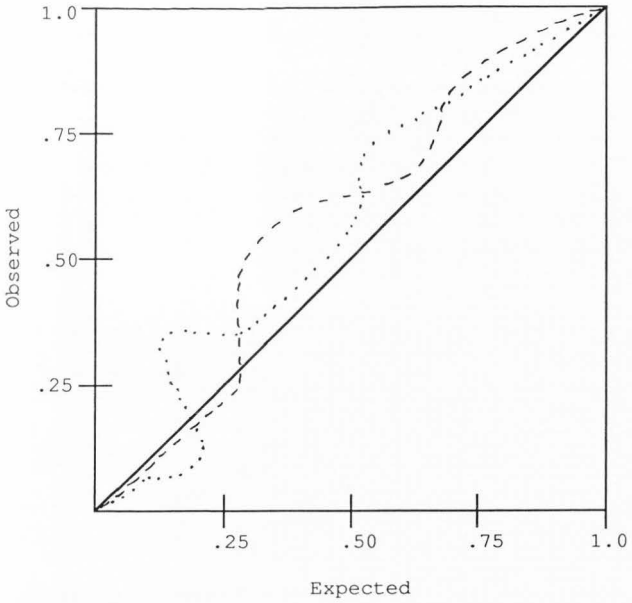


Figure 17. Normal probability plot comparison between the subtraction-absolute value formual and the positive-real ratio formula for the Rosenberg Self-Esteem Scale for 15- to 17-year-old males.



Subtraction-Absolute Value Formula....

Positive-Real Ratio Formula - - - -

Figure 18. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Rosenberg Self-Esteem Scale for 15- to 17-year-old females.

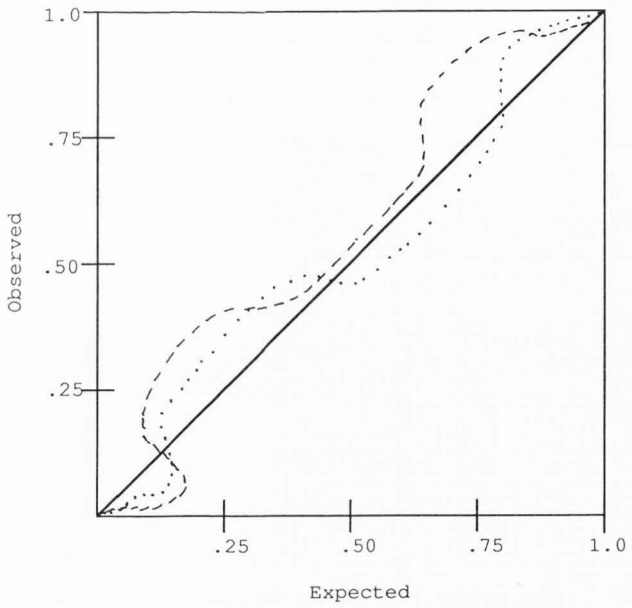
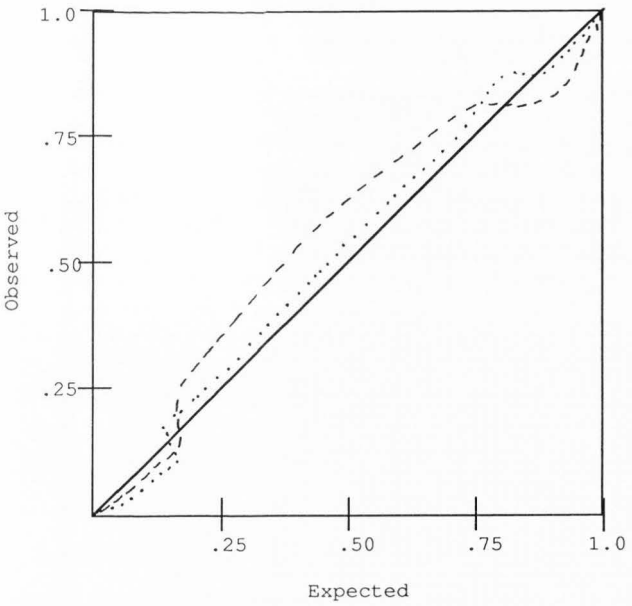


Figure 19. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Suicide Ideation Scale for 15- to 17-year-old males.



Subtraction-Absolute Value Formula ····

Positive-Real Ratio Formula - - - -

Figure 20. Normal probability plot comparison between the subtraction-absolute value formula and the postive-real ratio formula for the Suicide Ideation Scale for 15- to 17-year-old females.

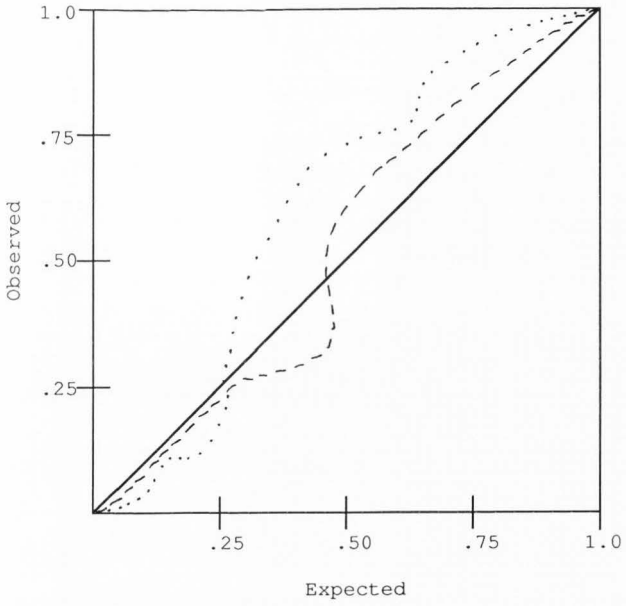


Figure 21. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Osgood Semantic Differential for 15- to 17-year-old males.

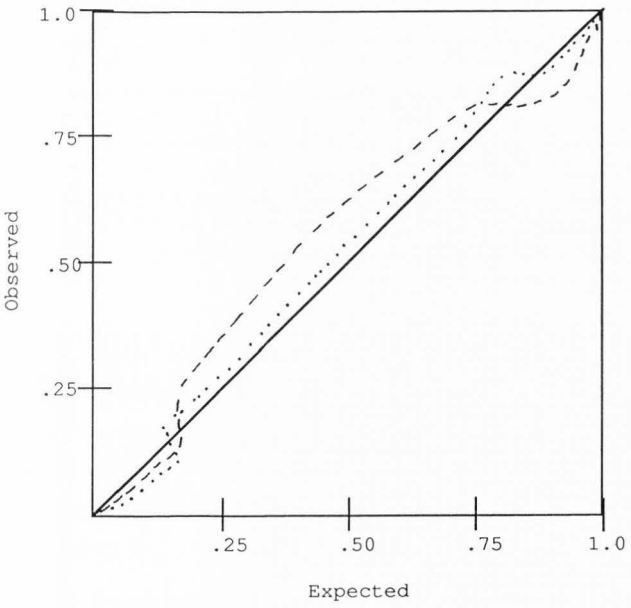


Figure 20. Normal probability plot comparison between the subtraction-absolute value formula and the postive-real ratio formula for the Suicide Ideation Scale for 15- to 17-year-old females.

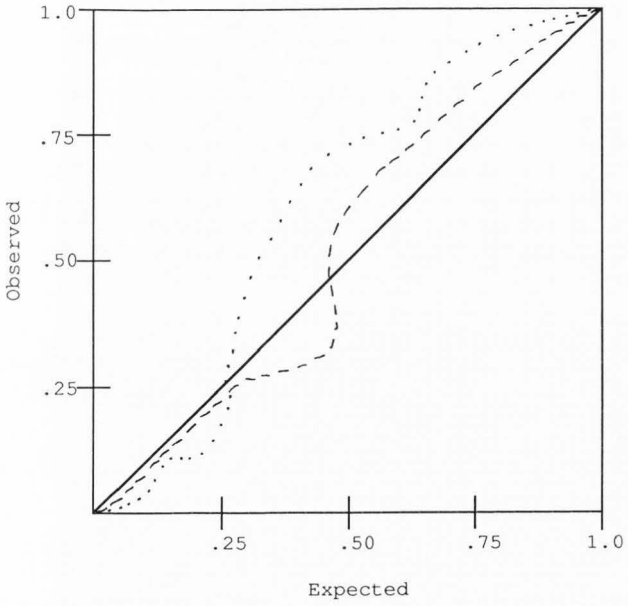
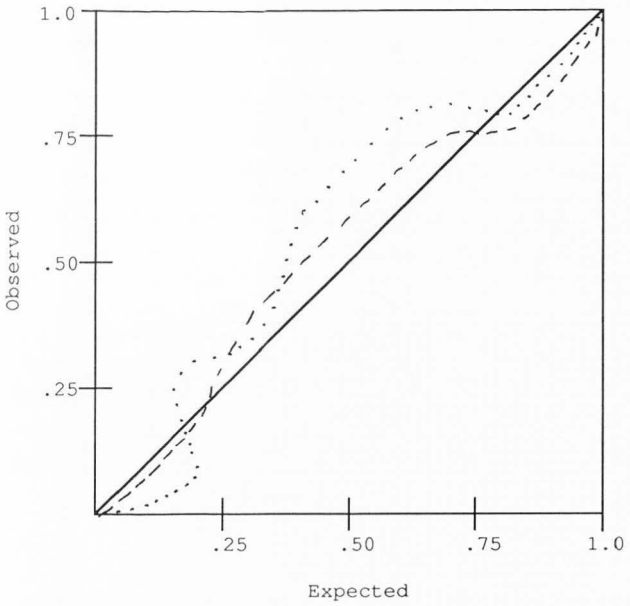


Figure 21. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Osgood Semantic Differential for 15- to 17-year-old males.



Subtraction-Absolute Value Formula ....

Positive-Real Ratio Formula _ _ _ _

Figure 22. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Osgood Semantic Differential for 15- to 17-year-old females.

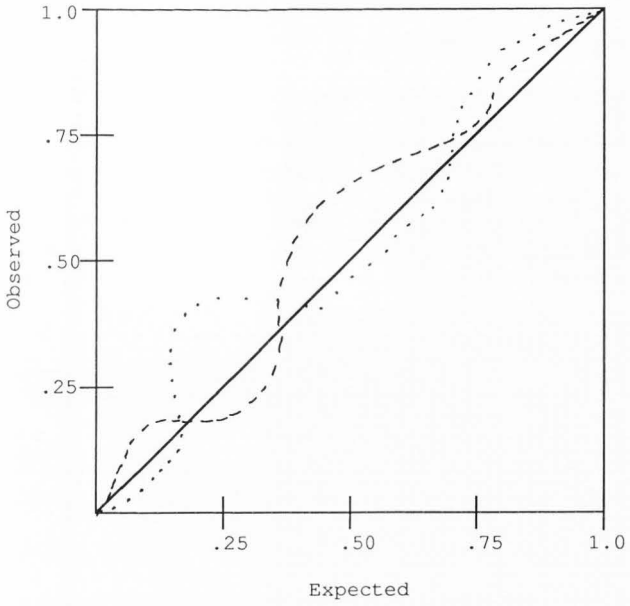
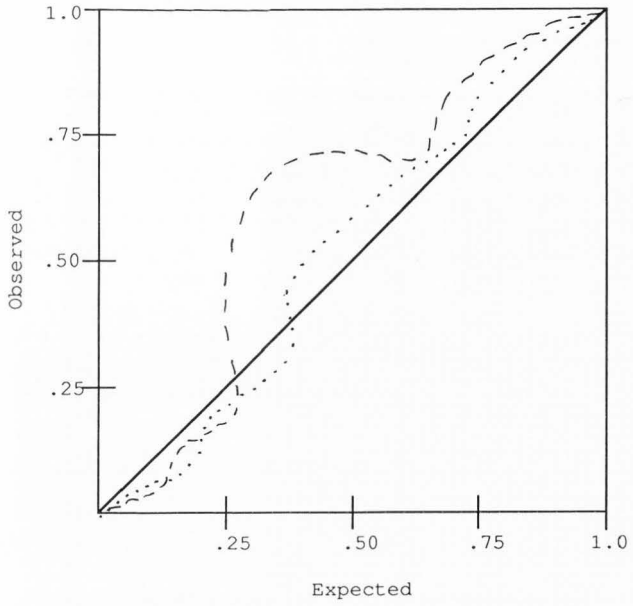


Figure 23. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Beck Depression Inventory for 15- to 17-year-old males.



Subtraction-Absolute Value Formula....

Positive-Real Ratio Formula _ _ _ _

Figure 24. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Beck Depression Inventory for 15- to 17-year-old females.

When the plot does not correspond adequately to the line of normality, which is often expected when using ratio formulas, there are four methods recommended to correct the data so that the data demonstrate a greater goodness of fit. The **first** is the arc sin transformation, which is utilized when the Y is a proportion or rate. The **second** is the square root, which is used when the variance is proportional to the mean of Y for a given X. The logarithmic method is the **third** correction technique used when the standard deviation is proportional to the mean. The **final** method is the inverse, which is called for when the standard deviation is proportional to the square of the mean (Norisus, 1990).

The findings indicate that across the six constuct-related scales for the 10-to 14-year-old males and females, that no transformation was necessary. To verify this assumption arc sin transformations were calculated for the UCLA Loneliness Scale, the Rosenberg Self-Esteem Scale, the Osgood Semantic Differential, and the Beck Depression Inventory, resulting in minimal or no difference in the scatter of the residuals on the plot demonstrating the line of normalcy, nor did the transformations change the amount of variance accounted for.

Based on the initial goodness of fit calculated for the Suicide Ideation Scale, for 10-to 14-year-old males, there was sufficient variation from the desired goodness of fit that the square root transformation, which is utilized when the frequency data for the scale contains values equal to zero, was used to correct the variation. Utilizing the square root transformation brought the residuals closer to the line of normality (see Figure 10). The proportion of the variance accounted for by the subtraction-absolute value formula was lowered by the square root transformation (R2 = .26055 to R2 = .10723). On the other hand, the square root transformation increased the amount of variance accounted for by the positive-real ratio formula (R2 = .26055 to R2 = .35163). Although it is appropriate to use a transformation technique to improve the goodness of fit, caution is warranted (e.g., is the increase in the variance merely an artifact of the transformation) and further investigation is called for.

Further investigation was also carried out in which a square root transformation was completed on the 10-to 14-year-old females for the Suicide Ideation Scale; however, this did not alter the amount of variance accounted for, nor did it alter the goodness of fit line for this age group.

For the 15 to 17 year old males and females, due to the fact that the residuals did not form around the line of normality as desired (see Figures 15 through 24), it was decided to use the appropriate transformation techniques, which are the arc sin, the inverse, the logarithmic, and the square root. The choice of which transformation technique to use was based on the frequency data for the construct scales. The following parameters determined which technique to use: (a) the arcsin transformation is appropriate if there are few values equal to zero and no negative values; (b) the logarithmic transformation is utilized if there are no zero values and no negatives; (c) the inverse is appropriate if the are few zero values and no negatives; and (d) the square root transformation is utilized when there are no zeros and few negatives.

In comparing the results obtained from the transformations (i.e., plot of residuals and the R Square) with those obtained from the regression analysis, minimal difference was noted. Greater confidence is given to the results derived wherein there is no difference as demonstrated in these analyses.

Hypothesis Two: There will be no difference in the results obtained in the calculation of self-conception

disparity for the Moos variables when comparing the subtraction-absolute value formula with the ratio formulas. Stuart (1990) included many important extant variables theoretically suggested as related to self-concept and self-esteem; however, she did not examine family-related variables. This study included 6 subscales adopted from the Moos Family Environment Scale (Moos & Moos, 1974) to evaluate the amount of variance which would be accounted for dependent on the formula used. For consistency and interpretative purposes, analyses were computed according to the method prescribed by Stuart (1990) and with pooled data. Tables 16 through 21 list the results from the analyses comparing the three formulas for calculating self-conception disparity with the six subscales of the Moos Family Environment Scale.

Table 16

Regression of the Eight Subscales of the OSCS on the Moos Subscale Cohesion for the Three Disparity Formulas

Subtraction-Absolute Value

	Beta	F	Significance
Philosophy	-.140651	-4.057	.0001
Personal	.043035	1.227	.2201
Mood	.010903	.291	.7714
Self-Control	-.039081	-1.045	.2963
Parents	-.120601	-3.287	.0010
Peers	-.055320	-1.478	.1396
Security	-.0562642	-1.352	.1766
Self-Confidence	-.091250	-2.049	.0408

R Square = .12056

Positive-Real Ratio

	Beta	F	Significance
Philosophy	.078244	2.779	.0056
Personal	-.069527	-2.317	.0207
Parents	.545826	19.381	.0000
Peers	.101653	3.439	.0006
Self-Control	.031757	1.008	.3139
Security	-.060964	-1.721	.0855
Mood	.116310	3.321	.0009
Self-Confidence	.006577	.173	.8626

R Square = .40675

Negative-Real Ratio

	Beta	F	Significance
Philosophy	.076101	2.611	.0092
Personal	-.053935	-1.719	.0859
Parents	.532320	17.953	.0000
Self-Control	.019399	.595	.5520
Peers	.036499	1.120	.2632
Mood	.088688	2.358	.0185
Security	-.013984	-.359	.7195
Self-Confidence	.020135	.484	.6287

R Square = .36672

Table 17

Regression of the Eight Subscales of the OSCS on the Moos Subscale Expressiveness for Each of the Three Disparity Formulas

Subtraction-Absolute Value

	Beta	F	Significance
Philosophy	-.159108	-4.536	.0000
Personal	-.012614	-.358	.7207
Mood	-.0043516	-.115	.9082
Self-Control	-.032328	-.859	.3904
Parents	-.108868	-2.950	.0033
Peers	-.144565	-3.841	.0001
Security	.040387	.965	.3348
Self-Confidence	-.012425	-.277	.7816

R Square = .11021

Positive-Real Ratio

	Beta	F	Significance
Philosophy	.015259	.497	.6193
Personal	.022780	.696	.4863
Parents	.476441	15.516	.0000
Peers	.153643	4.767	.0000
Self-Control	.001975	.057	.9542
Security	.061646	1.597	.1107
Mood	-.062891	-1.647	.0999
Self-Confidence	-.0164706	-.397	.6911

R Square =.29473

Negative-Real Ratio

	Beta	F	Significance
Philosophy	-.020849	-.658	.5107
Personal	.035419	1.038	.2993
Parents	.455410	14.370	.0000
Self-Control	-.031286	-.883	.3777
Peers	.053223	1.504	.1330
Mood	-.089619	-2.192	.0286
Security	.041249	.975	.3299
Self-Confidence	.110966	2.452	.0144

R Square =.25147

Table 18

Regression of the Eight Subscales of the OSCS on the Moos Subscale Conflict for Each of the Three Disparity Formulas

Subtraction-Absolute Value

	Beta	F	Significance
Philosophy	.102690	2.880	.0041
Peers	-.029094	-.807	.4201
Mood	-.055078	-1.427	.1538
Self-Control	.068085	1.770	.0771
Parents	.089404	2.369	.0180
Peers	.077372	2.010	.0447
Security	.021714	.507	.6120
Self-Confidence	.052361	1.143	.2534

R Square= .06955

Positive-Real Ratio

	Beta	F	Significance
Philosophy	-.049618	-1.562	.1185
Personal	.056853	1.680	.0932
Parents	-.388703	-12.237	.0000
Peers	-.099673	-2.989	.0029
Self-Control	-.144514	-3.222	.0013
Security	.042615	1.067	.2863
Mood	-.188173	-2.990	.0029
Self-Confidence	.068487	1.598	.1104

R Square = .24532

Negative-Real Ratio

	Beta	F	Significance
Philosophy	-.050240	-1.568	.1171
Personal	.036715	1.056	.2873
Parents	-.377220	-11.773	.0000
Self-Control	-.124949	-3.486	.0005
Peers	-.013970	-.893	.3917
Mood	-.123750	-2.994	.0028
Security	.024676	.557	.5642
Self-Confidence	.065695	1.436	.1514

R Square= .23488

Table 19

Regression of the Eight Subscales of the OSCS on the Moos Subscale Independence for Each of the Three Disparity Formulas

Subtraction-Absolute Value

	Beta	F	Significance
Philosophy	-.176684	-4.952	.0004
Personal	-.124175	-.670	.5032
Mood	.017538	.454	.6498
Self-Control	.010463	.272	.7858
Parents	-.035849	-.949	.3427
Peers	.042425	1.102	.2709
Security	-.075279	-1.758	.0791
Self-Confidence	-.076281	-1.664	.0965

R Square = .06839

Positive-Real Ratio

	Beta	F	Significance
Philosophy	.081440	2.352	.0189
Personal	.028950	.785	.4328
Parents	.230043	6.642	.0000
Peers	.070256	1.932	.0536
Self-Control	.034508	.890	.3735
Security	-.038163	-.876	.3811
Mood	.024029	.558	.5771
Self-Confidence	.001502	.032	.9744

R Square = .10273

Negative-Real Ratio

	Beta	F	Significance
Philosophy	.088049	2.525	.0117
Personal	.058842	1.567	.1173
Parent	.221125	6.340	.0000
Self-Control	-.036526	-.936	.3494
Peers	-.012192	-.313	.7544
Mood	-.014028	-.312	.7553
Security	-.019494	-.419	.6756
Self-Confidence	.097275	1.953	.0511

R Square = .09330

Table 20

Regression of the Eight Subscales of the OSCS on the Moos Subscale Organization for Each of the Three Disparity Formulas

Subtraction-Absolute Value

	Beta	F	Significance
Philosophy	-.075974	-2.122	.0341
Personal	.052590	1.452	.1468
Mood	.004735	.122	.9028
Self-Control	-.052963	-1.371	.1707
Parents	-.104510	-2.758	.0059
Peers	-.042870	-1.109	.2675
Security	.028202	.656	.5118
Self-Confidence	-.109952	-2.390	.0170
			R Square = .06198

Positive-Real Ratio

	Beta	F	Significance
Philosophy	.028360	.840	.4010
Personal	-.042013	-1.168	.2430
Parents	.235432	6.974	.0000
Peers	.120030	3.390	.0007
Self-Control	.090103	2.385	.0173
Security	-.054642	-1.287	.1938
Mood	.027029	.644	.5199
Self-Confidence	.095726	2.101	.0359
			R Square = .14754

Negative-Real Ratio

	Beta	F	Significance
Philosophy	.028770	.844	.3991
Personal	-.034933	-.951	.3416
Parents	.223000	6.537	.0000
Self-Control	.105136	2.755	.0060
Peers	.057939	1.521	.1287
Mood	.050699	1.152	.2496
Security	-.027084	-.595	.5523
Self-Confidence	.065239	1.339	.1808
			R Square = .13260

Table 21

Regression of the Eight Subscales of the OSCS on the Moos Subscale Control for Each of the Three Disparity Formulas

Subtraction-Absolute Value

	Beta	F	Significance
Philosophy	.066212	1.804	.0716
Personal	-.053658	-1.445	.1488
Mood	-.020382	-.513	.6080
Self-Control	.009994	.252	.8008
Parents	-.018220	-.496	.6392
Peers	.063406	1.600	.1098
Security	.047399	1.076	.2822
Self-Confidence	.007743	.164	.8696

R Square= .01400

Positive-Real Ratio

	Beta	F	Significance
Philosophy	.026675	.771	.4409
Personal	.031784	.862	.3888
Parents	-.310300	-8.967	.0000
Peers	-.114510	-3.153	.0017
Self-Control	-.004741	-.122	.9026
Security	.082886	1.905	.0571
Mood	-.048735	-1.132	.2577
Self-Confidence	.019529	.418	.6759

R Square = .10438

Negative-Real Ratio

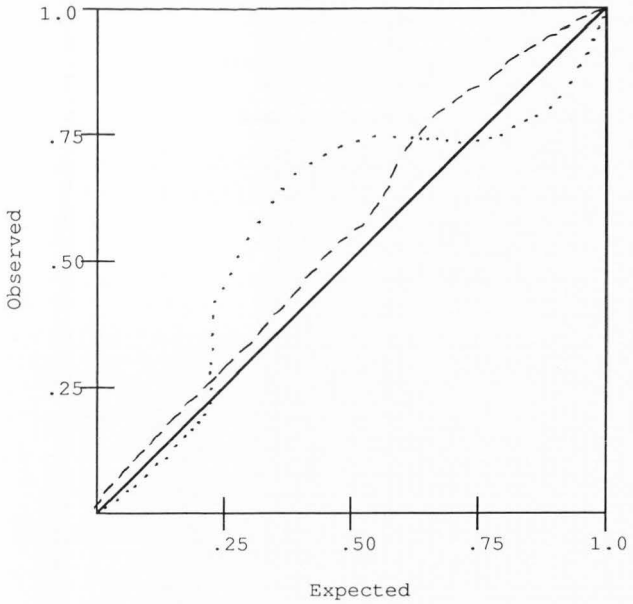
	Beta	F	Significance
Philosophy	.040457	1.159	.2467
Personal	.042127	1.121	.2625
Parents	-.297275	-8.514	.0000
Self-Control	.021606	.553	.5802
Peers	-.057547	-1.476	.1403
Mood	-.017921	-.398	.6908
Security	.034184	.733	.4636
Self-Confidence	-.045831	-.919	.3582

R Square = .09145

The findings presented in Tables 15 through 20 can be interpreted in the same manner as that of Stuart (1990). Inasmuch as the null hypothesis states that there will be no difference in the results obtained in the calculation of self-conception disparity for the Moos variables when comparing the subtraction-absolute value formula with the ratio formulas, the hypothesis is rejected.

Consistent with the results of Stuart, when using pooled data and examining the line of normality, a better goodness of fit was noted for the ratio formula than for the subtraction-absolute formula (see Figures 25 through 30). No correction method was deemed necessary.

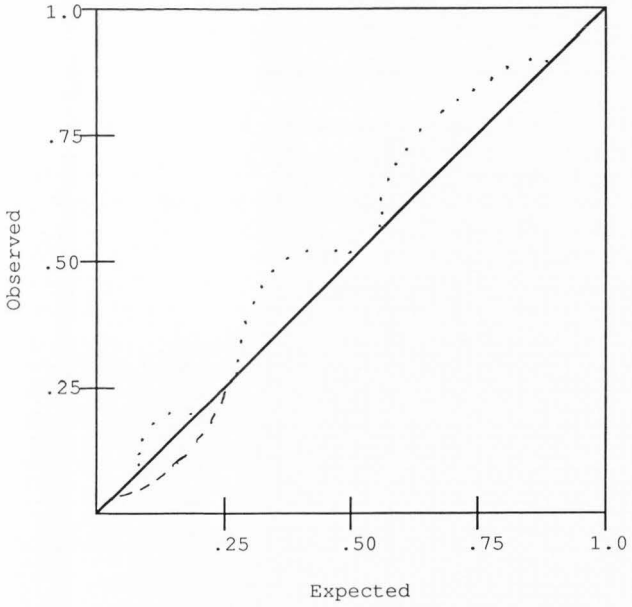
Hypothesis Three: There will be no difference in the results obtained in the calculation of self-conception disparity for the Moos variables when comparing the Subtraction-Absolute Value Formula with the Ratio Formula, taking into consideration age and gender. To be consistent in the replication of Stuart's work, this portion of the analysis extends the evaluation of the Moos subscales beyond pooled data, examining for the effects of age and gender on the amount of variance accounted for. Tables 22 and 23 present the results of these analyses.



Subtraction-Absolute Value Formula . . . .

Positive-Real Ratio Formula _ _ _ _

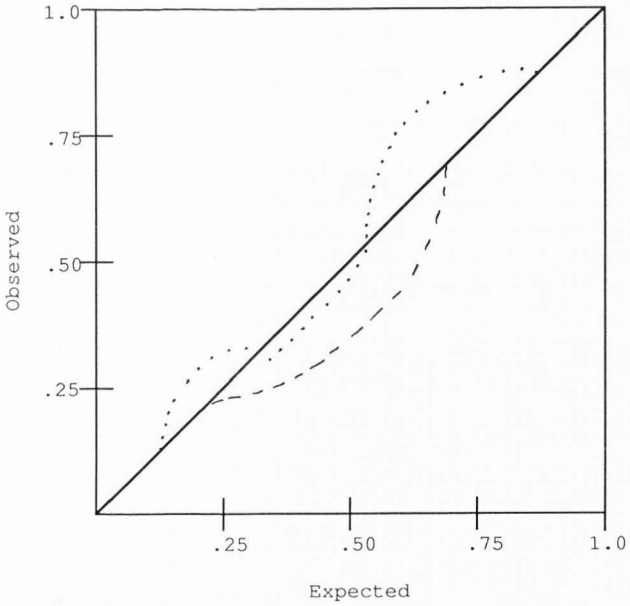
Figure 25. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Moos subscale cohesion.



Subtraction-Absolute Value Formula · · · ·

Positive-Real Ratio Formula _ _ _ _

Figure 26. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Moos subscale expressiveness.



Subtraction-Absolute Value Formula . . . .

Positive-Real Ratio Formula - - - -

Figure 27. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Moos subscale conflict.

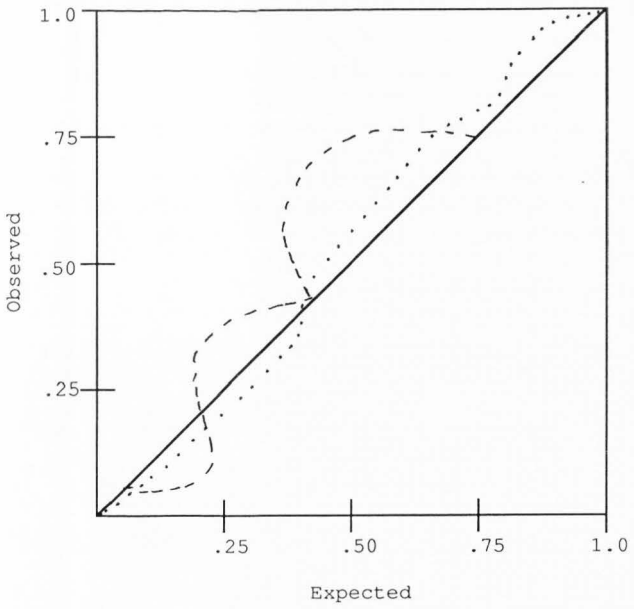
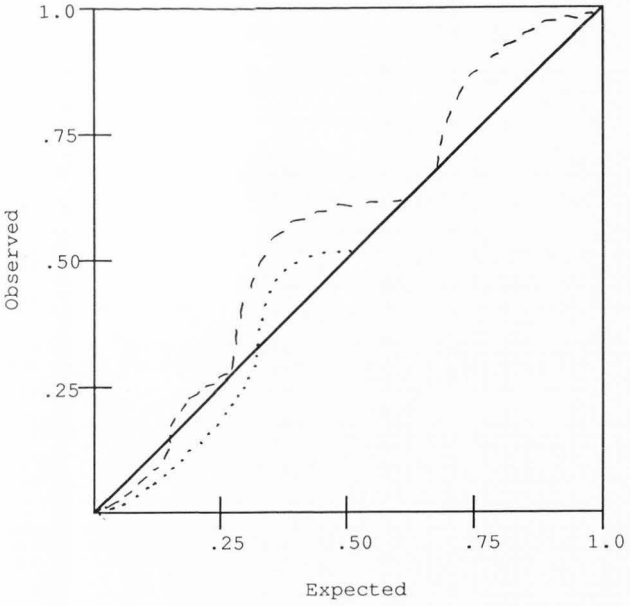


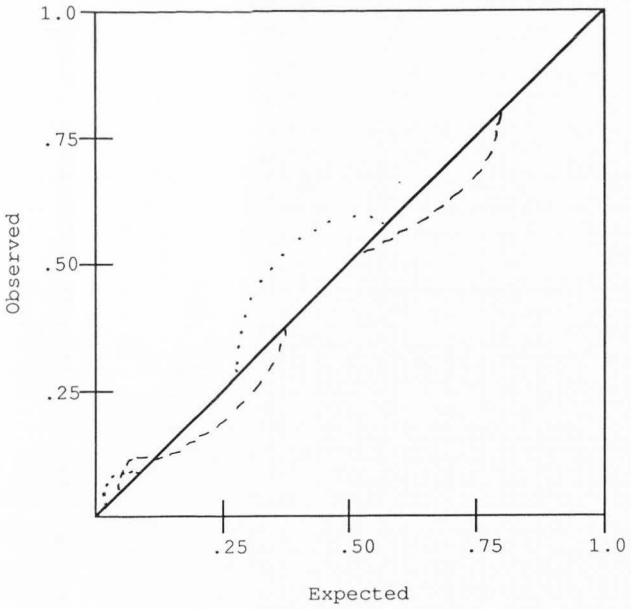
Figure 28. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Moos subscale independence.



Subtraction-Absolute Value Formula . . . .

Positive-Real Ratio Formula _ _ _ _

Figure 29. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Moos subscale organization.



Subtraction-Absolute Value Formula....

Positive-Real Ratio Formula_ _ _ _

Figure 30. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Moos subscale control.

Table 22

Regression of the Eight Subscales of the OSCS on the Moos Family Environment Scale for 10- to 14-year-old Males and Females, Respectively, for Two Disparity Formulas

Males

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	-.180910	-2.246	.0260
Personal	-.181328	-2.601	.0101
Philosophy	.264833	3.428	.0008
Self-Control	-.131191	-1.928	.0556
Security	.102144	1.332	.1846
Peers	.510509	6.371	.0000
Mood	-.094534	-1.180	.2396
Parents	.208342	2.348	.0201
			R Square=.46696

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	.329908	3.362	.0004
Personal	-.106756	-1.290	.1987
Philosophy	-.415962	-5.423	.0000
Self-Control	.019180	.232	.8172
Mood	-.155953	-1.842	.0672
Peers	.228691	2.733	.0069
Parents	.245892	2.918	.0040
Security	-.046138	-.523	.6017
			R Square=.30521

Females

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	.153605	1.604	.1101
Philosophy	-.210574	-2.955	.0035
Personal	.040617	.555	.5794
Self-Control	-.006886	-.093	.9262
Mood	.163078	2.198	.0290
Parents	-.336499	-.522	.6024
Peers	.078415	.978	.3290
Security	-.099857	-1.199	.2318
			R Square=.08548

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	.040319	.417	.6728
Philosophy	-.035312	-.487	.6265
Peers	-.093748	-1.283	.2009
Personal	-.047717	-.621	.5351
Self-Control	-.019536	-.251	.8021
Parents	.214645	2.670	.0081
Security	-.162069	-1.811	.0715
Mood	.168886	1.834	.0680
			R Square=.07228

Table 23

Regression of the Eight Subscales of the OSCS on the Moos Family Environment Scale for 15- to 17-year-old Males and Females Respectively for Two Disparity Formulas

Males

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	.610224	1.185	.0741
Philosophy	-.604897	-2.932	.0082
Personal	-.177822	-.817	.4237
Mood	-.739112	-3.888	.0009
Peers	.637743	2.701	.0138
Parents	.264785	1.083	.2917
Self-Control	-.195072	-.747	.4640
Security	-.035720	-.133	.8959

R Square=.69813

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	.117420	.482	.6353
Parents	.208751	1.347	.1932
Personal	-.129443	-.753	.4601
Philosophy	-.065432	-.372	.7135
Self-Control	-.205504	-1.001	.3286
Peers	.375705	1.910	.0706
Security	.192507	.726	.4761
Mood	.340987	1.076	.2947

R Square=.57010

Females

Subtraction-Absolute Value

	Beta	F	Significant F
Self-Confidence	.108524	.784	.4367
Personal	.046372	.430	.6693
Philosophy	-.301713	-2.756	.0082
Mood	-.176750	-1.526	.1337
Parents	-.032000	-.297	.7677
Self-Control	-.251160	-2.254	.0288
Peers	-.074005	-.554	.5823
Security	.844963	5.324	.0000

R Square=.55652

Positive-Ratio

	Beta	F	Significant F
Self-Confidence	.273731	1.374	.1759
Philosophy	-.017344	-.120	.9046
Personal	-.180829	-1.299	.2001
Peers	.206146	1.394	.1696
Self-Control	.257971	1.614	.1130
Mood	.081370	.482	.3623
Parents	.161783	1.005	.3199
Security	-.123576	-.715	.4780

R Square=.33756

The results for 10-to 14-year-old males for the Moos Family Environment Scale (Table 22) indicate that the amount of variance accounted for by the subtraction-absolute value formula (R2 = .46696) is greater than that of the positive-real ratio formula (R2 = .30521). Thus the null hypothesis is rejected in favor of the subtraction-absolute value formula.

For the 10-to 14-year-old females (Table 22), the null hypothesis was accepted because there was virtually not difference in the amount of variance accounted for, utilizing the Moos Family Environment Scale.

In Table 23, for 15-to 17-year-old males and females, the findings demonstrate more variance accounted for by subtraction-absolute value formula (R2 = .69813 males; R2= .55652 females) than that accounted for by the positive-ratio formula (R2 = .57010 males; R2 = .33756 females) when using the subscales of the Moos Family Environment Scale. Relative to the findings noted above, the null hypothesis is rejected in favor of the subtraction-absolute value formula.

Inasmuch as there is such a difference in results obtained in this section, it is suggested that more research is warranted to investigate the influences of age and gender on the amount of variance accounted for.

Figures 31 through 34 display the regression plots for the Moos Family Environment Scale (see figures 31 through 34).

For the Moos Family Environment Scale the regression plots indicate that the residuals deviate somewhat from the line of normalcy. The results depicted in Figures 31 to 34 indicate that the plot for the positive-real ratio formula more closely approximates the line of normalcy than does the subtraction-absolute value formula. Utilizing an arc sin transformation, an attempt was made to improve the goodness of fit; however, the results of this calculation did not change significantly the goodness of fit nor did they alter the amount of variance accounted for.

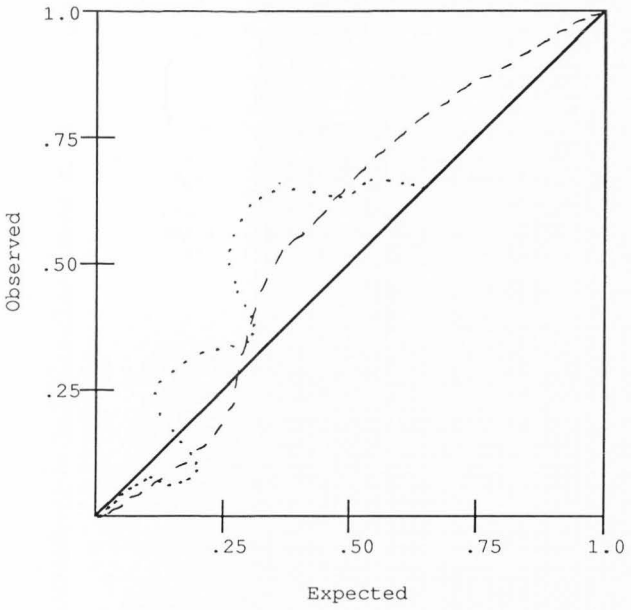
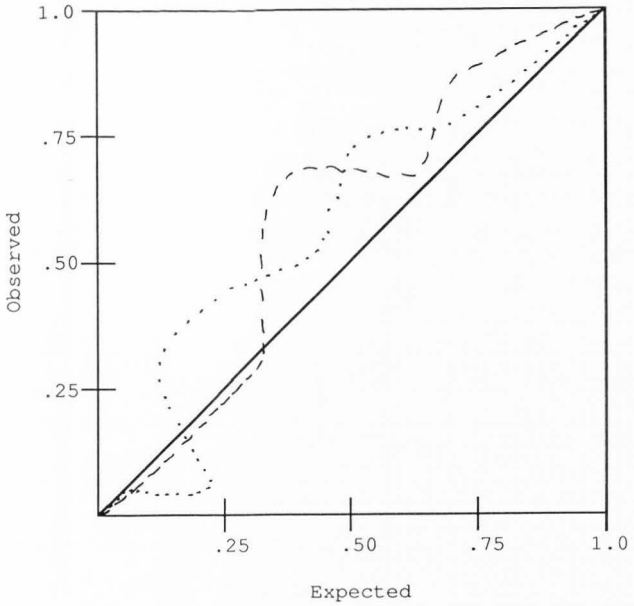


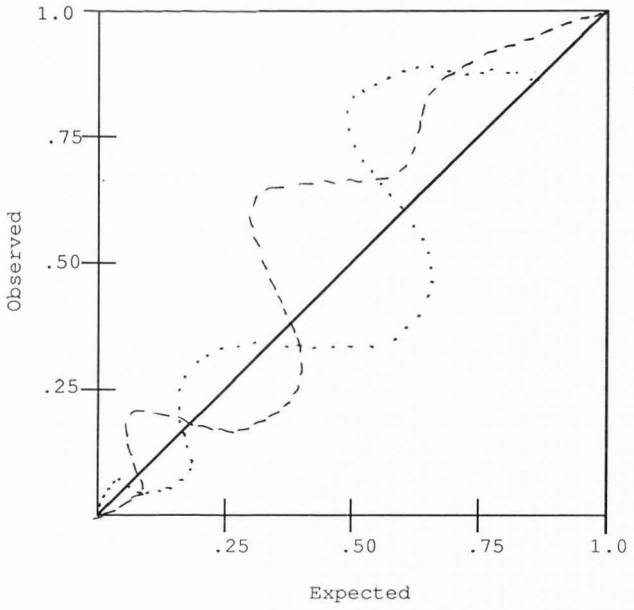
Figure 31. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Moos Family Environment Scale for 10- to 14-year-old males.



Subtraction-Absolute Value Formula. . . .

Positive-Real Ratio Formula _ _ _ _

Figure 32. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Moos Family Environment Scale for 10- to 14-year-old females.



Subtraction-Absolute Value Formula . . . .

Positive-Real Ratio Formula _ _ _ _

Figure 33. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Moos Family Environment Scale for 15- to 17-year-old males.

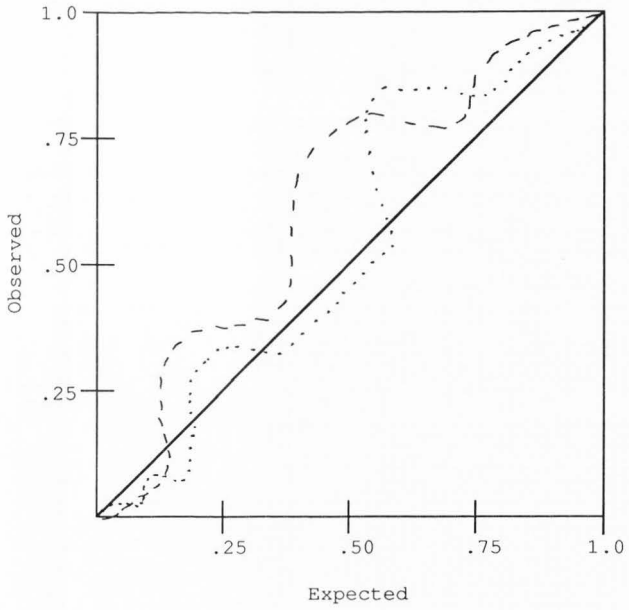


Figure 34. Normal probability plot comparison between the subtraction-absolute value formula and the positive-real ratio formula for the Moos Family Environment Scale for 15- to 17-year-old females.

DISCUSSION

The purpose of this study was to replicate the findings of Stuart (1990) by examining construct-related scales posited as being associated with self-concept and self-esteem. Specifically, this study examined Stuart's conclusion that the ratio formula accounts for a greater proportion of the variance than does the subtraction-absolute value formula. The modification on the replication consisted of examining these construct-related scales, controlling for gender and age.

Stuart's research used pooled data, excluding the variables of gender and age. A secondary analysis was completed utilizing subscales from the Moos Family Environment Scale. These subscales were not included in the work of Stuart.

While this study found similarities with the findings of Stuart, there were a sufficient number of discrepancies noted to warrant careful consideration of her conclusions. This discussion will focus on the commonalities, as well as the differences noted when examining the data by gender and age.

Hypothesis One: Using the selected construct scales from Stuart's (1990) study, it was hypothesized

that there would be no difference in the amount of variance obtained from the calculation of self-conception disparity for the selected substantive variables when comparing the subtraction-absolute value formula with the ratio formula, taking age and gender into consideration. In comparing the results obtained in this study with those suggested by Stuart it was found that, when comparing the amount of variance accounted for by the subtraction-absolute value formula in contrast to the ratio formula and controlling for age and gender, the ratio formula accounted for more of the variance than did the subtraction-absolute value formula for 9 out of 11 comparisons among 10-to 14-year-old males and females. For males, 10 to 14, the ratio formula accounted for more of the variance in four of the six comparisons, whereas this was true in all five of the comparisons for females. The one analysis in which the ratio formula did not account for more of the variance was the UCLA Loneliness Scale. In this analysis, the subtraction-absolute value formula accounted for more variance.

When comparing the amount of variance accounted for by the subtraction-absolute value formula in contrast to the ratio formula, and controlling for age and gender, the ratio formula accounted for more of the

variance than did the subtraction-absolute value formula for 7 out of 10 comparisons among 15-to 17-year-old males and females. In 2 of the 10 comparisons, there was no significant difference in the amount of variance accounted for between the ratio and subtraction-absolute value formulas. Among the 15-to 17-year-old males, it was found that the ratio formula accounted for more of the variance in three out of the five comparisons. The amount of variance accounted for in the UCLA Loneliness Scale was greater with the subtraction-absolute value formula. For the Rosenberg Self-Esteem Scale, there was no difference in the amount of variance accounted for between the two formulas. In terms of the 15-to 17-year-old females, the ratio formula accounted for more of the variance in four of five analyses. The one analysis which deviated from the expected was that using the UCLA Loneliness Scale where the results indicate that neither formula accounted for more of the variance than did the other.

While the majority of the findings suggest that the null hypothesis can be rejected in favor of the ratio formula, continued research is warranted. Several reasons underlie this recommendation. First, in 2 of the 20 comparisons the difference in the amout of variance accounted for was neglibible when

comparing the two formulas. Consequently, the null hypothesis was accepted. Secondly, in 2 of the 20 comparisons the null hypothesis was accepted in favor of the subtraction-absolute values formula. It is unclear as to why these results were obtained. It may have something to do with the relationship between development and an individual's understanding of loneliness. Another explanation may be that the results may be merely an artifact of the methodological procedure used. Regardless, it is important that continued research examine these discrepancies.

Hypothesis Two: There will be no difference in the results obtained in the calculation of self-conception disparity for the Moos variables when comparing the subtraction-absolute value formula with the ratio formula. In order to test Hypothesis One, the eight subscales of the Openshaw Self-Concept Scale (OSCS) were regressed on six subscales of the Moos Family Environment Scale examining the amount of variance obtained by each of the three formulas namely, the positive real-ratio, the negative real-ratio, and the subtraction-absolute value formulas. Consistent with the findings of Stuart, when pooling the data, the ratio-formulas accounted for a greater proportion of the variance than did the subtraction- absolute value

formula. Consequently, the null hypothesis is rejected in favor of the ratio formula.

Concern with accepting the results of these findings is consistent with concern previously discussed, that is, that gender and age were not controlled. This concern is amplified by the findings associated with Hypothesis One wherein analyses were found in which the ratio formula did not account for more of the variance. This issue became the basis of Hypothesis Three.

Hypothesis Three: There will be no difference in the amount of variance obtained in the calculation of self-conception disparity for the Moos variables when comparing the subtraction-absolute value formula with the ratio formula taking into consideration age and gender. Because of concerns raised when analyzing "pooled" data, it was decided that the subscales of the Moos Family Environment Scale would be examined by incorporating gender and age into the analyses. For 10-to 14-year-old males, results suggest that the amount of variance accounted for by the subtraction-absolute value formula is greater than that of the positive-real ratio formula. This is in direct contrast to the findings when the data are pooled. For this analysis the null hypothesis is rejected in favor

of the subtraction-absolute value formula. For the analysis that examined the 10-to 14-year-old female group, the data indicate that there was virtually no difference in the amount of variance accounted for regardless of the formula employed. The null hypothesis was accepted in this case.

When examining the results for 15-to 17-year-old males and for 15-to 17-year-old females, the findings suggest that for both subject groups, the subtraction-absolute value formula accounts for a greater proportion of the variance than does the ratio formula. Relative to the findings noted above, the null hypothesis is rejected in favor of the subtraction-absolute value formula.

In the results of Hypothesis Two, one would be led to believe that the ratio formula, regardless of whether one uses the positive or negative real ratio, would account for more of the variance than would the subtraction-absolute value formula. Contrary to this suggestion, the findings, when controlling for gender and age, indicate just the opposite, that the subtraction-absolute value formula accounts for more of the variance. This adds considerable confusion, suggesting that the pooling of data may affect the analyses sufficiently so as to warrant caution to the

interpretation of results acquired in this manner.

Conclusions

Two principal conclusions can be drawn from the results of this research. First is the clear understanding that an examination of pooled data may produce results inconsistent with those one may acquire when controlling for influences such as gender and age. Secondly, while the ratio formula did show promise, this was not the case in all situations. It is interesting to note that in two scales this was particularly true, namely the UCLA Loneliness Scale and the Moos Family Environment Scale. While it is uncertain as to why this would be the case, it is evidence for suggesting further clarification and empirical investigation to ferret out questions of methodology, as well as influences such as gender and age.

Limitations

While considerable effort was implemented to assure as homogeneous a sample as possible, the sample acquired was a convenience sample because voluntary participation was required. Consequently, individuals selecting themselves into this study needed to be

possible that the students who participated in the study may not have been representative of the population at large. While it is true that a convenience sample most appropriately describes the participant pool, it must be noted that both the schools and the specific classes used in the study were randomly selected. Other sampling limitations were also noted; for example, the geographic location of the participants was limited to two western states and there was a predominant religious orientation. With these limitations in mind, one must be cautious of generalizing the findings of this study beyond the sample used.

A second limitation is found in that no further analyses were conducted to ascertain why there would be discrepancies in the results obtained. For example, no examination of which variables loaded first in the regression analysis was conducted. Future research, attending more carefully to examinations such as this, may yield information pertinent to the effect of gender and age on the calculation of self-conception disparity and which method of calculation will account for a greater amount of variance.

Finally, it is unclear as to whether or not the formula used to calculate self-conception disparity

examines the same or different self-referent phenomena. Consequently, the differences obtained may be a product of one formula addressing one aspect of the phenomena included in a selected construct scale while the other formula addressed another aspect.

Recommendations for Future Research

With the desire to increase ones understanding of self-esteem and how it is formed in an individual, it is critical to understand the two primary theoretical orientations of the methods of calculating self-conception disparity. A variety of positions have been cited in the literature; however, the review encompassed in this study would suggest that a developmental orientation would be the most advantageous, as Achenbach and Zigler (1963) have suggested. With this in mind, it is imperative that a method of calculating self-conception disparity, which can be applied developmentally, be identified. It is the contention of this research, as it is with Stuart (1990), that the operationalization of James' (1890) ratio formula holds considerable promise, particularly since it seems to provide a mechanism by which the two theoretical orientations of Rogers and Dymond, (1954) and Achenbach and Zigler, (1963) and philosophies

associated with the relationship between self-esteem and the relative amount of self-conception disparity can be integrated.

This study should be merely considered a beginning point in ascertaining the value of operationalizing James' formula. While the results have some elements of ambiguity, there is considerable consistency that can not be neglected. One of the most advantageous beginning points for future research would be to continue the investigation of the relevance of using James' formula. This could initially be done by again examining for the amount of variance accounted for, but with different construct-related scales. Another focus should be the examination of the results of the regression analyses to determine whether or not gender and age influence the amount of variance accounted for. It would not be inappropriate to suggest that the OSCS be more closely scrutinized and revision made to enhance the ideal, positive and negative real conception statements, and the self-esteem statements so that they are age and gender appropriate. Finally, it would be important to ascertain if James' formula could differentiate between individuals who are psychologically disturbed from those who are not, based on the derived self-conception disparity score.

Further research necessary to address this issue is recommended to ascertain the reliability of each subscale by age and gender.

REFERENCES

Achenbach, T., & Zigler, E. (1963). Social competence and self-image disparity in psychiatric and nonpsychiatric patients. Journal of Abnormal and Social Psychology, 67, 197-205.

American Psychiatric Association. (1987). Diagnostic and statisical manual of mental disorders (3rd ed.) (DSM-III-R). Washington, DC: Author.

Beck, A.T., Rush A.J., Shaw, B.F., & Emery, G. (1979). Cognitive therapy of depression. New York: The Guilford Press.

Blatt S.J., D'Afflitti, J.P., & Quinlan, D.M. (1976). Experiences of depression in normal young adults. Journal of Abnormal Psychology, 85, 383-389.

Blatt, S.J., Wien S.J., Chevron, E., & Quinlan, D.M. (1979). Parental representations and depression in normal young adults. Journal of Abnormal Psychology, 88, 388-397.

Blatt, S.J., Quinlan, D.M., Chevron, E.S., McDonald, C., & Zuroff,D. (1982). Dependency and self-criticism: Psychological dimensions of depression. Journal of Consulting and Clinical Psychology, 50, 113-124.

Block, J., & Thomas, H. (1955). Is satisfaction with self a measure of adjustment? Journal of Abnormal and Social Psychology, 51, 254-259.

Devries, A.G. (1966) A potential suicide personality inventory. Psychological Reports, 18(3), 731-738.

Hillson, J. S., & Worchel, P. (1957). Self-concept and defensive behavior in the maladjusted. Journal of Consulting Psychology, 21, 83-88.

James, W. (1890). The principles of psychology. New York: Henry Holt.

Kearny, K.L. (1988). The effects on depression of adolescent heroes, self-image disparity, and disillusionment with parents. Unpublished doctoral dissertation, Adelphi University, New York, NY.

Moos, R.H., & Moos B.S. (1974). Moos family environment scale manual. Palo Alto, CA: Consulting Psychologists Press.

Norisus, M. (1990) Spss introductory statistics student guide. Chicago: SPSS, Inc.

Openshaw, D. K. (1978). The development of self-esteem in the child: Model theory versus parent-child interaction. Unpublished doctoral dissertation, Brigham Young University, Provo, UT.

Openshaw, D. K., & Thomas, D. L. (1986). The adolescent self and the family. In G. K. Leigh & G. W. Peterson (Eds.), Adolescents in families (pp. 104-129). Cincinnati, OH: Southwestern Publishing Co.

Openshaw, D.K., Thomas, D.L., & Rollins, C.B. (1981).

Adolescent self-esteem: A multidimensional perspective. Journal of Early Adolescence, 1, 273-282.

Ott, L., Larson, R.F., & Mendenhall, W. (1983). Statistics: A tool for the social sciences. Boston: Duxbury Press.

Piaget, J. (1952). The origins of intelligence in children. New York: International University Press.

Piaget, J. (1960). The child's conception of physical causality. Patterson, NJ: Littlefield, Adams.

Rogers, C., & Dymond, R. F. (1954). Psychotherapy and personality change. Chicago: The University of Chicago Press.

Russell, D., Peplau, L.A., & Lutrona, C.E. (1980). The revised UCLA Loneliness Scale: Concurrent and discriminant validity evidence. Journal of Personality and Social Psychology, 39, 472-480.

Scott, W. (1958). Research definitions of mental health and mental illness. Psychological Bulletin, 55, 29-45.

Stuart, D. M. (1990). A comparison of two self-conception diaparity methods operationalized within and adolescent population. Unpublished master's thesis, Utah State University, Logan.

Turner, R. H. (1968). The self-conception in social interaction. In C. Gordon & K.J. Gergen (Eds.), The self in social interaction (pp. 93-106). New York: John Wiley and Sons, Inc.

Werner, H. (1948) Comparitive psychology of mental development. New York: Follett.

Wylie, R. C. (1974). The self-concept. Volume one. Lincoln: University of Nebraska Press.

APPENDICES

Appendix A
Formula Score Variations

	Ratio	Subtraction-Absolute Value
I am and I should not be more	1/2=.2	1-5=4
I am and I should not be more	1/4=.25	1-4=3
I am I don't know if I should be more	1/3=.33	1-3=2
I am I should not be more	2/5=.4	2-5=3
I am and I should be more	1/2=.5	1-2=1
I am and I should not be more	2/4=.5	2-4=2
I don't know if I am and I should not be more	3/5=.6	3-5=2
I am I don't know if I should be more	2/3=.67	2-3=1
I don't know if I am and should not be more	3/4=.75	3-4=1
I am not and I should not be more	4/5=.8	4-5=1
I am and I should be more	1/1=1	1-1=0
I don't know if I am and I don't know if I should be more	3/3=1	3-3=0
I am not and I should not be more	4/4=1	4-4=0
I am not and I should not be more	5/5=1	5-5=0
I am not and I should not be more	5/4=1.25	5-4=1
I am not and I don't know if I should be more	4/3=1.33	4-3=1

I don't know if I am and I should be more	3/2=1.5	3-2=1
I am not and I don't know if I should be more	5/3=1.67	5-3=2
I am and I should be more	2/1=2	2-1=2
I am not and I should be more	4/2=2	4-2=2
I am not and I should be more	5/2=.5	5-2=3
I don't know if I am and I should be more	3/1=3	3-1=2
I am not and I should be	4/1=4	4-1=3
I am not and I should be more	5/1=5	5-1=4

Adopted with permission of
Stuart (1990)

Appendix B
Brief Description of the Proposed Self-Esteem Project

Brief Description of the Proposed Self-Esteem Project

Dr. Kim Openshaw and two of this students, Layne Bennion and Diane Stuart, are conducting a research project focusing on self-esteem.
Self-esteem, as you may know, is how we feel about ourselves and our performance in school, home, or at work. Many young adults find it difficult to feel good about themselves as they experience changes in their lives and face major decisions. As you may have experienced, low self-esteem effects everything you try to do. Although the notion of self-esteem is common knowledge there remains much to discover about it's roots and development.
Because of the importance of self-esteem in young adults' lives, this project has been initiated.

This class has been selected to participate in this study dealing with the conceptualization of self-esteem along with approximately 1500 other junior high, middle school, high school and college students throughout Utah, and southern Idaho.

Participation in this study involves completing a questionnaire composed of items from several commonly used self-esteem surveys, personality measures and a family environment scale in order to understand what aspects of a person and their surroundings are related to self-esteem.

The questionnaire will take approximately 30 minutes to one hour to complete.

No one will know what answers you put down. The questionnaires are identified only by a number.

If you would like to participate, take home a parent consent form which your parents sign indicating their permission for you to participate. In a few days (or specify date if a time has already been set up) Dr. Openshaw or one of his students will visit the class to explain more about the project and give those who are interested questionnaires. You need to have your parents permission to participate.

Dear Teachers:

Many parents and teachers have indicated that one quality they desire their students to achieve is positive self-esteem. Feeling positive about him/herself is directly related to how well your students are able to perform in school or at home and will affect which future paths your son or daughter may choose to follow. Although the notion of self-esteem is common knowledge, there remains much to discover about it's roots and development.

Because of the importance of self-esteem in young people's lives, this project has been initiated.

Presently. self-esteem is thought of as a single personality constuct. Some recent research indicates, however, that self-esteem may be multidimensional; that is , what is frequently labeled as self-esteem may actually be several different interacting parts of the personality. We believe this study will help provide a clearer understanding of what self-esteem is and how it functions in the personality and enable educators, social scientists and clinicians who work with adolescents to more accurately guide the development of self-esteem.

Your class has been ramdomly selected to participate in a study dealing with the conceptualization of self-esteem along with approximately 1500 other junior high, middle school, high school and college students throughout Utah and southern Idaho.

The students in your class are asked to complete a questionnaire composed of items from several commonly used self-esteem instruments, personality measures (e.g., character traits, loneliness, suicidal thoughts and depression) and family environment scales in order to understand what aspects of a person and their surroundings are related to self-esteem. The questionnaire will take approximately 30 minutes to 1 hour to complete.

In addition we are asking that the parents of the participating sutdents fill out a short, two page demographic form attached to the student questionnaire.

Participation in this project is voluntary and pariticpants can choose to dicontinue paricipation at any time. There is no foreseeable risk associated with your students' participation in this study. However, some research suggests that individuals already feeling depressed or who are currently comtemplating suicide may experience an increase in symptoms when exposed to information related to their disorder (e.g. , through the news media, television programs, or questionnaires). If you notice any changes in your

students which are of concern to you, we encourage you to seek appropriate menal health intervention.

Any information which would identify a particular child, family or school will be held strictly confidential.

Your students' name will not be associated with his/her answers in any form as the questionnaires are identifies by number. Any reported results from this study will presented as group findings, never as individual responses.

The school superintendent and principal are aware of this project and have given their permission to us to ramdomly select classrooms in the distirct to ask for student participation.

Although the analysis of the data will take several months, we will be happy to share a summary of the findings with any interested parents or participants. If you are interested in the results of this study, write your name and mailing adress in the space provided below and we will send you a copy.

Participating students are to return the completed forms to you tomorrow and a member of the research staff will return and collect the questionnaires.

May we express appreciation in advance for your support of this project. If you have any questions about participation, please feel free to contact us.

Sincerely,

Dr. D Kim Openshaw
Principal Investigator
Associate Professor of Family and Human Development
Utah State University
Logan, Utah
(801) 750-1548

Layne D. Bennion
Project Director
(801)753-3578
Associate Director of the Laboratory for Adolescent Research

Diane Stuart
Research Assistant
(801)750-1544

Teacher Informed Consent

I have read the above information and agree to allow my class to participate in this study.

_____
(Signature)

_____
(Date)

I would like to receive a summary of the research findings.

Name_____

Mailing
Address_____

Dear Parents:

Many parents have indicated that one quality they desire their children to achieve is positive self-esteem. Feeling positive about him/herself is directly related to how well your son or daughter is able to perform in school or at home and will affect which future paths your son or daughter may choose to follow. Although the notion of self-esteem is common knowledge, there remains much to discover about it's roots and development.

Because of the importance of self-esteem in young people's lives, this project has been initiated.

Presently. self-esteem is though of as a single personality constuct. Some recent research indicates, however, that self-esteem may be multidimensional; that is , what is frequently labeled as self-esteem may actually be several different interacting parts of the personality. We believe this study will help provide a clearer understanding of what self-esteem is and how it functions in the personality and enable ecucatiors, social scientists and clinicians who work with adolescents to more accurately guide the development of self-esteem.

Your son or daughter has been ramdomly selected to participate in a study dealing with the conceptualization of self-esteem along with approximately 1500 other junior high, middle school, high school and college students throughout Utah and southern Idaho.

Your student is asked is asked to complete a questionnaire composed of items from several commonly used self-esteem instruments, personality measures (e.g., character traits, loneliness, suicidal thoughts and depression) and family environment scales in order to understand what aspects of a person and their surroundings are related to self-esteem. The questionnaire will take approximately 30 minutes to 1 hour to complete. Should you choose to allow your student to participate, we ask that you encourage him/her to fill out the questionnaire and return it to his/her teacher tomorrow.

In addition we are asking that the parents of the participating students fill out a short, two page demographic form attached to the student questionnaire.

Participation in this project is voluntary and pariticpatnes can choose to dicontinue paricipation at any time. There is no foreseeable risk associated with your students' participation in this study. However, some research suggests that individuals already feeling depressed or who are currently comtemplating suicide may experience an increase in symptoms when exposed to

information related to their disorder (e.g. , through the news media, television programs, or questionnaires). If you notice any changes in your son or daughter which are of concern to you, we encourage you to seek appropriate menal health intervention.

Any information which would identify a particular child, family or school will be held strictly confidential. Your students' name will not be associated with his/her answers in any form as the questionnaires are identifies by number. Any reported results from this study will presented as group findings, never as individual responses.

The school superintendent and principal are aware of this project and have given their permission to us to ramdomly select classrooms in the district to ask for student participation.

Although the analysis of the data will take several months, we will be happy to share a summary of the findings with any interested parents or participants. If you are interested in the results of this study, write your name and mailing adress in the space provided below and we will send you a copy.

Participating students are to return the completed forms to you tomorrow and a member of the research staff will return and collect the questionnaires.

May we express appreciation in advance for your support of this project. If you have any questions about participation, please feel free to contact us.

Sincerely,

Dr. D Kim Openshaw
Principal Investigator
Associate Professor of Family and Human Development
Utah State University
Logan, Utah
(801) 750-1548

Layne D. Bennion
Project Director
(801)753-3578
Associate Director of the Laboratory for Adolescent Research

Diane Stuart
Research Assistant
(801)750-1544

Parental Informed Consent

I have read the above information and agree to allow my son/daughter to participate in this study.

_____
(Signature)

_____
(Date)

I would like to receive a summary of the research findings.

Name_____

Mailing
Address_____

Dear Participant:

Many young people find it difficult to feel good about themselves as they go through the changes of growing into adults. How we feel about ourselves is called self-esteem. As you may have experienced, it is hard to do well when you don't feel good about yourself. Because it is important to help teenagers develop good feelings about themselves we are studying self-esteem, to better understand what it is. Specifically, we are looking at self-esteem in teenagers to see if self-esteem is a single part of your personality or if it is actually composed of several smaller parts of your personality.

You have been selected to participate in a study about self-esteem along with approximately 1500 other junior high, middle school, high school and college students throughout Utah and southern Idaho.

We would like you to fill out the questionnaires passeed out to you according to how you feel about yourself. The questionnaires will take 30 minutes to about one hour to complete.

Participation in this study is voluntary, so you have the choice of deciding whether you would like to complete the inventories. You may choose not to participate at any time without any negative effects for you or your grade. There are no known risks to you if you participate. No one will be told what answers you put down. Only the professor, Dr. D Kim Openshaw, in charge of this project, and those working with him, will see your answers, but they will not know the names of those who fill out the questionnaires.

We think this study will help scientists better understand the concept of self-esteem, what it means and what we can do to help young people feel better about themselves as they develop.

Thank you for helping us and sharing with us your feelings.

Sincerely,

Dr. D Kim Openshaw
Principal Investigator
Associate Professor of
Family and Human
Development
Utah State
University
Logan, Utah
(801) 750-1548

Layne D. Bennion
Project Director
(801)753-3578
Associate Director
of the Laboratory
for Adolescent
Research

Diane Stuart
Research
Assistant
(801)750-1544

Participant Informed Consent

I have discussed the project with Dr. Openshaw or one of his assistants, read the above information and agree to participate in study.

_____
(Signature)

_____
(Date)

Dear Participants:

Many young adults find it difficult to feel good about themselves as they experience changes in their lives and face major decisions. As you may have experienced, low self esteem effects everything you try to do. Although the notion of self-esteem is common knowledge, there remains much to discover about it's roots and development.
Because of the importance of self-esteem in young people's lives, this project has been initiated.

Presently. self-esteem is though of as a single personality constuct. Some recent research indicates, however, that self-esteem may be multidimensional; that is , what is frequently labeled as self-esteem may actually be several different interacting parts of the personality. We believe this study will help provide a clearer understanding of what self-esteem is and how it functions in the personality and enable ecucatiors, social scientists and clinicians who work with adolescents to more accurately guide the development of self-esteem.

Your class has been selected to participate in a study dealing with the conceptualization of self-esteem along with approximately 1500 other junior high, middle school, high school and college students throughout Utah and southern Idaho.

Participation in this study invlolves completing a questionnaire composed of items from several commonly used self-esteem instruments, personality measures (e.g., character traits, loneliness, suicidal thoughts and depression) and family environment scales in order to understand what aspects of a person and their surroundings are related to self-esteem. Fill out the questions relating to the family as if you were living at home. The questionnaire will take approximately 30 minutes to 1 hour to complete. Should you choose to allow your student to participate, we ask that you fill out the questionnaire and bring it back to the next class period.

For junior high and high school students that participated, we asked the parents to fill out the first two pages of demographic information. Please complete these first two pages yourself as if you were presently living at home.

Participation in this project is voluntary and pariticpatnes can choose to dicontinue paricipation at any time. There is no foreseeable risk associated with your students' participation in this study. However,

some research suggests that individuals already feeling depressed or who are currently comtemplating suicide may experience an increase in symptoms when exposed to information related to their disorder (e.g. , through the news media, television programs, or questionnaires). If you notice any changes in your yourself which are of concern to you, we encourage you to seek appropriate menal health intervention.

Any information which would identify a particular child, family or school will be held strictly confidential. Your name will not be associated with his/her answers in any form as the questionnaires are identifies by number. Any reported results from this study will presented as group findings, never as individual responses.

Although the analysis of the data will take several months, we will be happy to share a summary of the findings with any interested parents or participants. If you are interested in the results of this study, write your name and mailing adress in the space provided below and we will send you a copy.

May we express appreciation in advance for your support of this project. If you have any questions about participation, please feel free to contact us.

Sincerely,

Dr. D Kim Openshaw
Principal Investigator
Associate Professor of Family and Human Development
Utah State University
Logan, Utah
(801) 750-1548

Layne D. Bennion
Project Director
(801)753-3578
Associate Director of the Laboratory for Adolescent Research

Diane Stuart
Research Assistant
(801)750-1544

Participant Informed Consent

I have read the above information and agree to participate in this study.

_____
(Signature)

(Date)

I would like to receive a summary of the research findings.

Name_____

Mailing
Address_____

1. The square root transformation was used in this particular analysis to evaluate whether or not this transformation would improve the goodness of fit and the amount of variance accounted for in the Suicide Ideation Scale for 10-14 year old Males. This procedure was selected based on the discussion of the various transformation techniques presented in the results section.